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THE MODEL ENGINEER

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5TH OCTOBER 1950 VOL. 103 NO. 2576

SMOKE RINGS

Our Cover Picture

● THERE ARE few model engineers who have not, at some time or other, had the urge to build a scale model windmill, yet the thought is but rarely followed up by action, and there are far fewer authentic examples of such models than there deserve to be. Once common landmarks in many parts of the countryside, the typical English windmill is rapidly becoming extinct, and for this reason alone, they are worthy objects for the art and craft of the model maker. Some notable examples of windmill models have been seen at "M.E." Exhibitions in the past, including the superb sectional model of Sprowston mill by the late Mr. H. O. Clark, of Norwich, which was posthumously entered in the Loan Section of the first post-war exhibition in 1946. The sole representative of this type of model at this year's exhibition was the Sussex tower mill built by Mr. D. A. Dubbin, of Fulham, London, S.W., which appears to be a generally correct reproduction of this particular type, and in detail and finish, has a very pleasing atmosphere of realism. The photograph has been taken from about base level, with the intention of reproducing the angle of view at which the prototype would normally be seen; and had it been considered desirable to do so, very little faking of the base and background would be sufficient to disguise the fact that it was a model.

Cornish Pumping Engines

● AS THE result of a letter from a lady in High Wycombe whose husband has completed the construction of a 1-in. scale Cornish pumping engine, we have been investigating the possibility of preparing a set of drawings from which readers will be able to appreciate the enormous possibilities of these interesting old veterans.

Confirmation of the interest which was aroused by our "Smoke Ring" in the July 13th issue of the "M.E." arrived recently in the form of an article and illustrations from a Cornish engineer who is in touch with the Society for the Preservation of Cornish Engines and this we hope to publish in a near future issue. We shall be pleased to hear from any other readers who may be interested in this intriguing subject.

A Missing Model Csr

● INFORMATION HAS been received that between April 15th and May 15th, 1950, a model racing car, built up from a "Maserati" kit produced by the Experimental & Model Co., Coventry, is alleged to have been stolen from the Handicrafts Section of Royal Air Force Station, Hereford.

Anyone who can give any information either on the theft or the whereabouts of this model is asked to communicate with the Provost Marshal, Air Ministry, Government Building, Bromyard, Avenue, Acton, London, W.3.

A Veterans' Reunion

● THE PHOTOGRAPH on this page, which was taken on the demonstration stand at the "M.E." Exhibition, is typical of many scenes which are encountered each year, when old friends or former clubmates meet to discuss old times. It shows four of the founder members of the Victoria Model Steamboat Club, namely Messrs. E. W. Vanner, Thomas Duff, Thomas Dysart, and William Blaney, while a fifth, Mr. George Crowe, is in the picture though not fully visible These members have not had an opportunity of meeting each other since 1908. Mr. Vanner, who is well known to all model power boat enthusiasts as one of the most active of the old-timers, gave some very interesting demonstrations of the art of building sheet metal hulls, at which he is an acknowledged master. It may be mentioned also that Mr. Blaney, who is perhaps best remembered by his pseudonym "The Carpenter's Mate," was a prolific writer on model power boat technicalities in early volumes of THE MODEL ENGINEER, and also a pioneer, in both design and practice, of progressive developments such as hydroplanes and flash steam.

Glasgow and South Western Railway Centenary

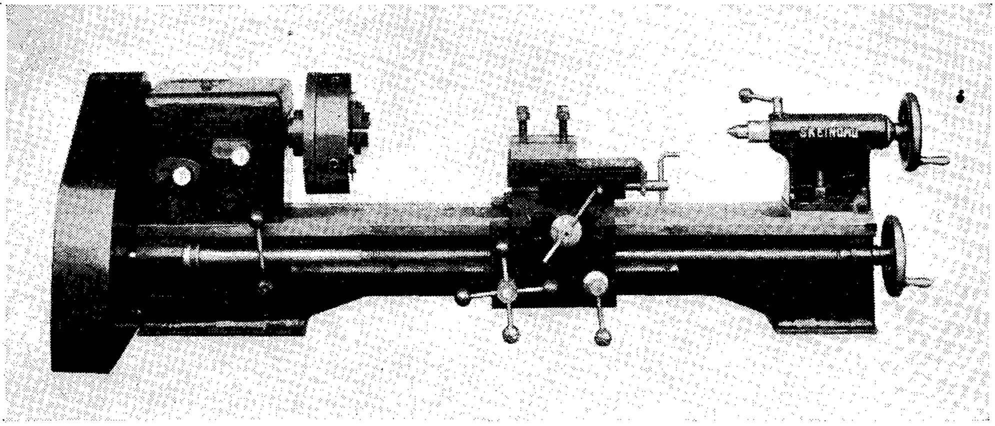
● AN EXHIBITION to commemorate the centenary of the Glasgow and South Western Railway will be held in the Mitchell Library, North Street, Glasgow, commencing on Monday October 16th and closing on Saturday, October 28th, the actual centenary day.

The old "Sou' West" is still affectionately remembered in Scotland, although it was often, though usually unjustifiably, maligned. In its later years, the services it provided and the efficiency with which it operated them, stood second to none, and it won high regard from its patrons and large numbers of railway enthusiasts. The organisation of the exhibition is a fitting tribute to the memory of a gallant railway.

Models, photographs, drawings, maps and relics will form the background to the show, and there will also be a working model railway with G. & S.W.R. engines, while a section will be devoted to railway literature. Other Scottish railways will also be represented, including the Campbeltown and Machrihanish Light Railway. The show will certainly be well worth a visit from anybody who can get there.

Those Tyres

● IT SEEMS curious that, after all the discussion which has taken place, in the "M.E." and elsewhere, on the correct representation of locomotive tyres in miniature, a new tendency has lately been making its appearance. This takes the form of making the tyres of driving and coupled wheels about twice the thickness of those of other wheels. It would be interesting to know what has given rise to this tendency, which is apparent even in many castings as well as in finished wheels ; it is certainly not derived from full-size practice, and, so far, we have not discovered any explanation of it. It is especially obtrusive when the tyres have been given a bright finish, and it spoils the whole effect.



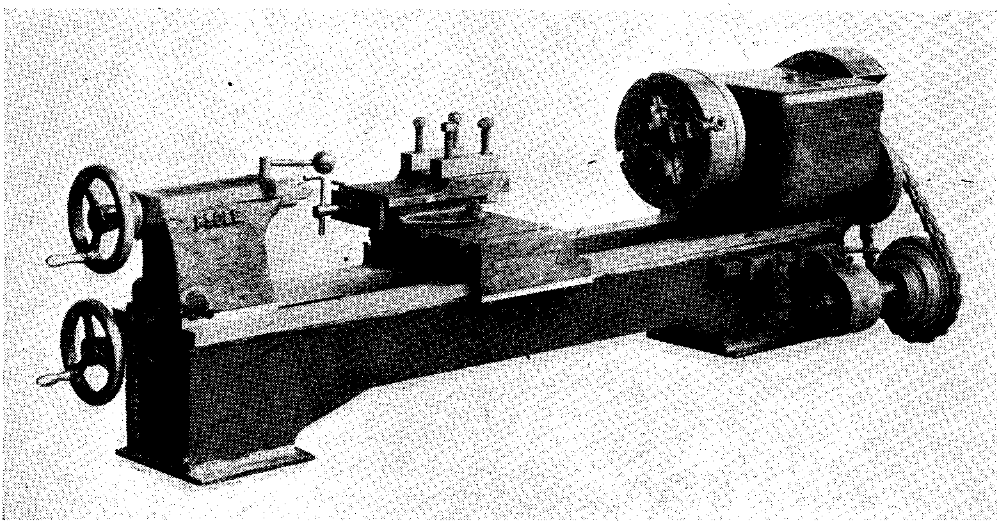
I Made a Lathe

The History of the Manufacture of a 4-in. Centre Lathe

by A. H. Poole

A YEAR or so ago, I became dissatisfied with the small 3-in. centre lathe which I possessed. I felt that I should have a new and more substantial machine, but when I started to make enquiries I found that not only were new lathes at a high price but were not quite just what I wanted. There was, therefore, no alternative but to get going and make a suitable machine.

I decided before doing anything that the lathe would not at any point come under the heading of " make do." The design was not to be limited by any consideration except those due to good engineering practice ; in other words, I was not going to improvise. All the machining operations were nevertheless kept reasonably simple. After deciding this point, I had quite a few pleasant hours thinking out exactly what I wanted. I jotted down ideas as they occurred until all the various parts were fixed. I might say here that I am very fond of making tools, and now that my lathe is complete I have made all my workshop equipment except such things as drills, micrometers, etc. In fact, if I did not keep myself in close check I would never finish a single project.



Back view of lathe, showing fast and loose pulley arrangement

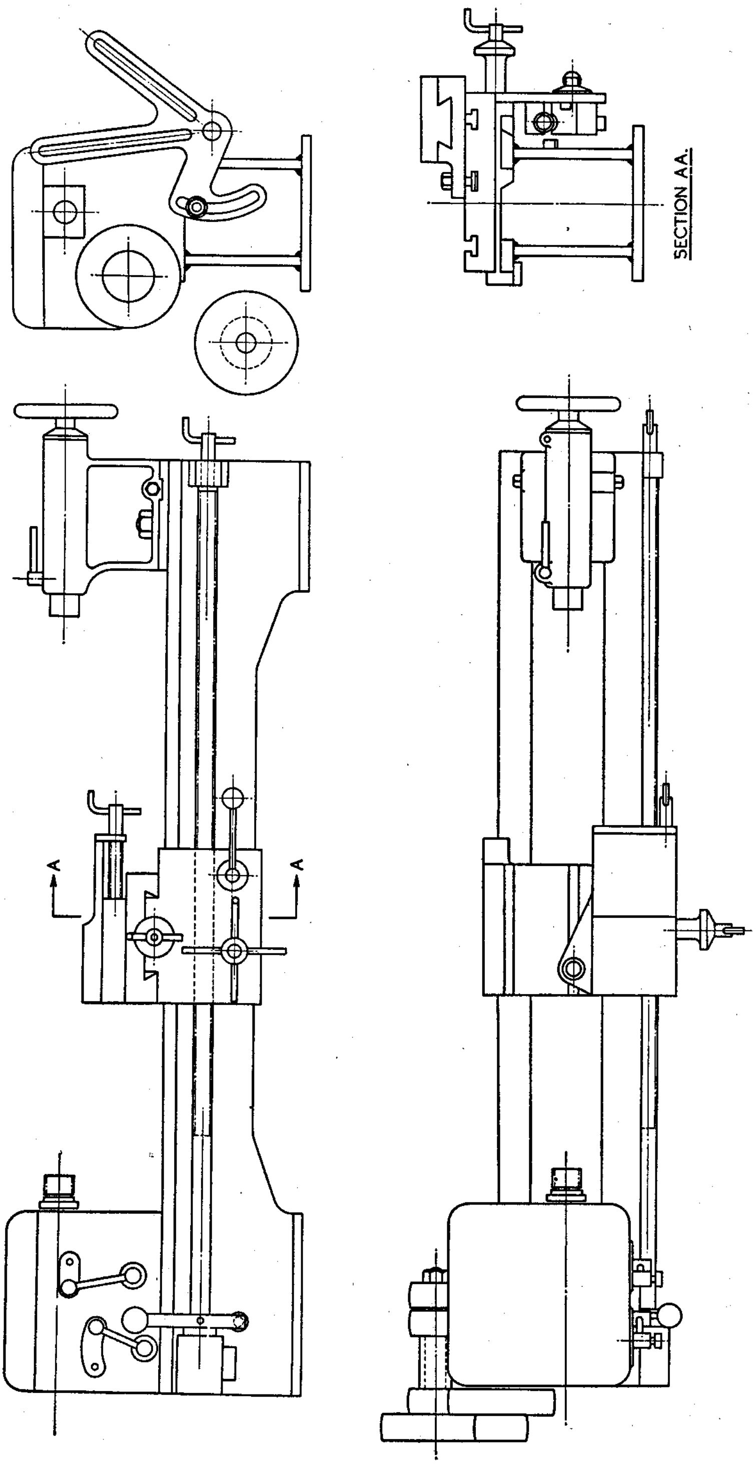


Fig. 1. General arrangement drawings of the lathe

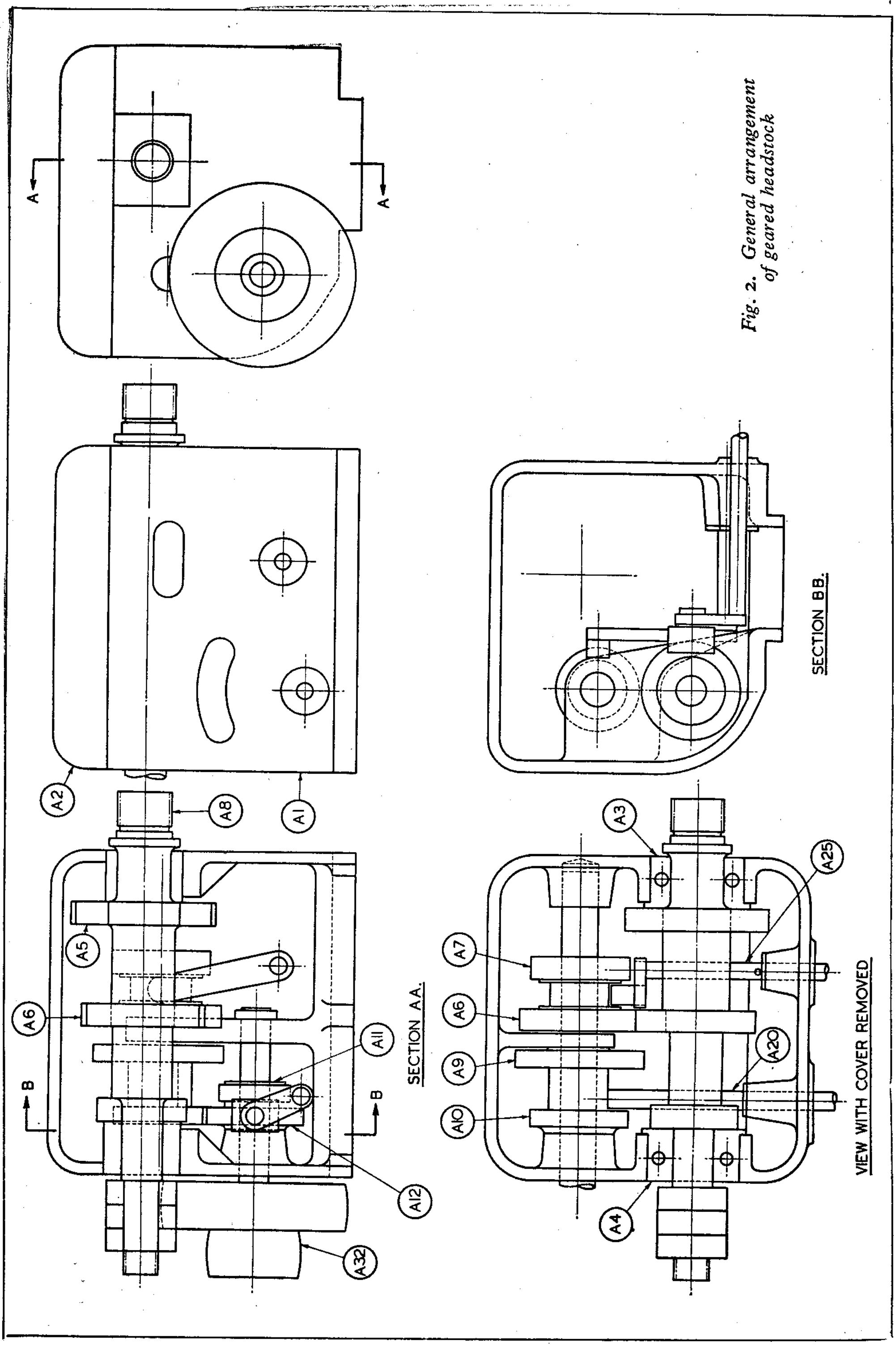


Fig. 2. General arrangement of geared headstock

In any case, I always add at least one item of workshop equipment per job; even when making the lathe I added a screw press and toolmaker's vice to my collection.

My next step was to get out my drawing board and instruments. With the design I proceeded in a more orderly manner. The bed, I decided, should be of the straight type, principally because it is more rigid than the gap bed. (Fig. 1.) The section of the bed was stressed out to get the material in a most advantageous form for bending and torsional stress resistance. The centre height was increased by 1 in. over my old lathe in order to compensate for the lack of a gap. This allows an 8 in. swing over the bed. The headstock is as full of my likes as possible. The spindle bearings are of the parallel type in two pieces to allow ample adjustment. I consider taper bearings unsound design, for they are extremely difficult to adjust when wear takes place. Usually, the spindle is moved out of line when tapered bearings are closed up to give a better fit. Ball- and roller-races were ruled out because, first, they were difficult to purchase, and secondly they do not appeal to me, for if they are not preloaded just right, chatter is the result. I decided on an all-geared drive in the headstock (Fig. 2) because I needed four gear wheels for a back gear in any

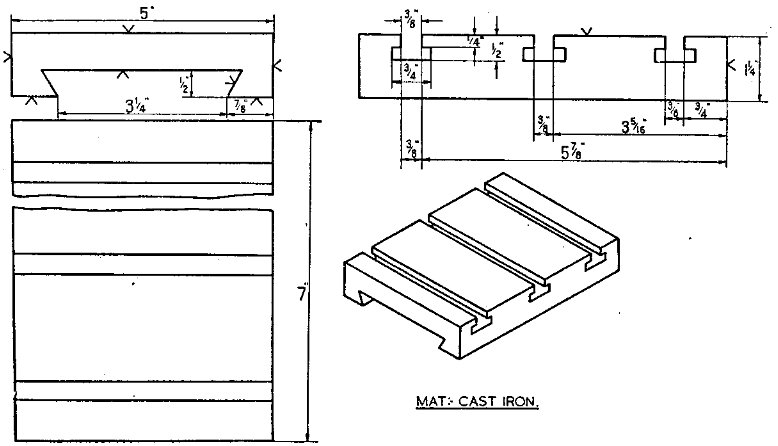


Fig. 3. Details of boring table cross-slide

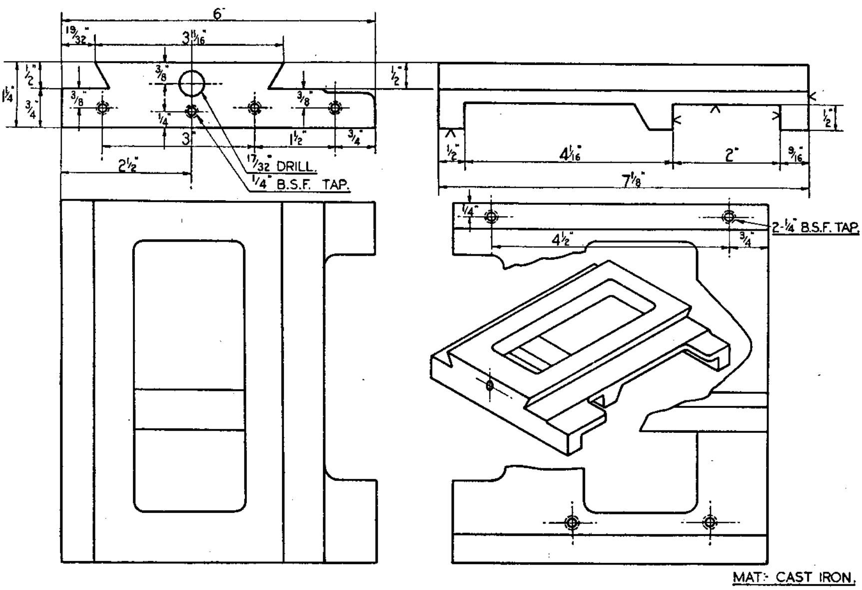


Fig. 5. Details of saddle

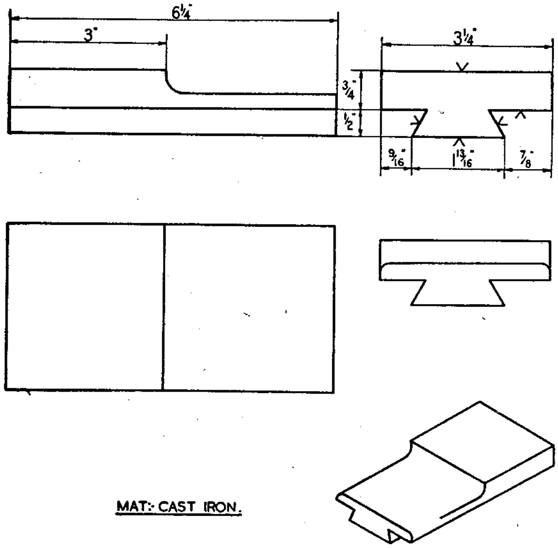


Fig. 6. Details of compound rest, forms toolpost

event ; so I just went the whole way and designed an arrangement which gave me a selection of 12 speeds between 60 and about 1,000. After these more important parts had been schemed out, I arranged the remainder of my pet fancies. A large substantial boring table was provided; (Fig. 3), the cross-slide travel was over 1 in. longer than the centre height, a straightforward tailstock was arranged and finally the drive to the machine was through a fast and loose pulley assembly on the back of the lathe, with the extension spindle bringing the control lever to a handy position in the front of the headstock. The assembly drawing being completed, each part and sub-assembly was drawn out in detail, the whole comprising about 14 sheets. I then had the design of my dream lathe, but I wonder how many would agree that it is also their ideal machine.

My next problem, or rather problems, was to find a means to manufacture the design. I was lucky in that I was allowed to use an 8-in. Southbend lathe (a nice machine tool) and a Richmond milling machine. Both machines were brand new and had an excellent range of equipment. I had, in addition, the use of a selection of micrometers and clock gauges. Unfortunately, I did not have the use of all this tool heaven for many months.

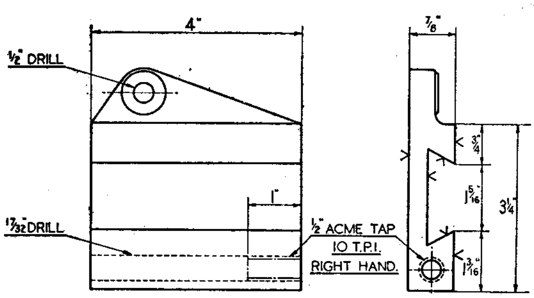


Fig. 7. Details of compound slide

The greater proportion of the fitting was done with very little equipment, but more of this later.

Everything was now ready for an initial start, the patterns I commenced with a light heart and a confident step. The first four patterns were those of the cross-slide, saddle, compound rest and its slide. (Figs. 3, 5, 6 and 7). As these were of simple shapes, no difficulties were experienced, except that the mahogany used was of a very peculiar and inconsistent grain. I then began the tailstock pattern (Fig. 8) making this in two pieces having the joint through the vertical axis along the length of the barrel. This was a little more difficult but was successfully accomplished. The fixed headstock was complicated and I spent many hours scheming out how to make this pattern. The shape was that of a rectangular box with a rounded bottom. I thought out a scheme with the pattern lying in every possible way in the moulding box until I

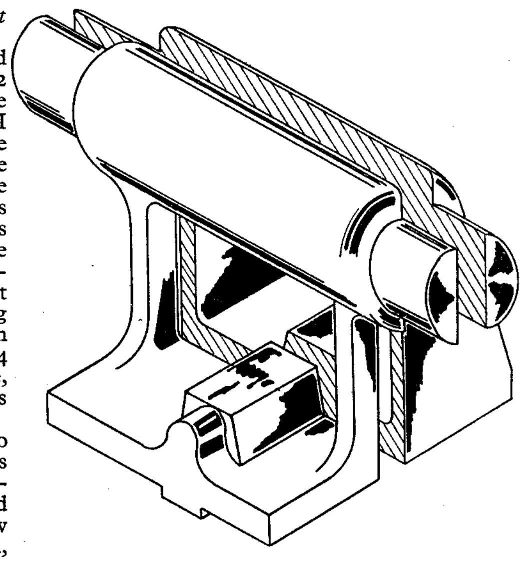
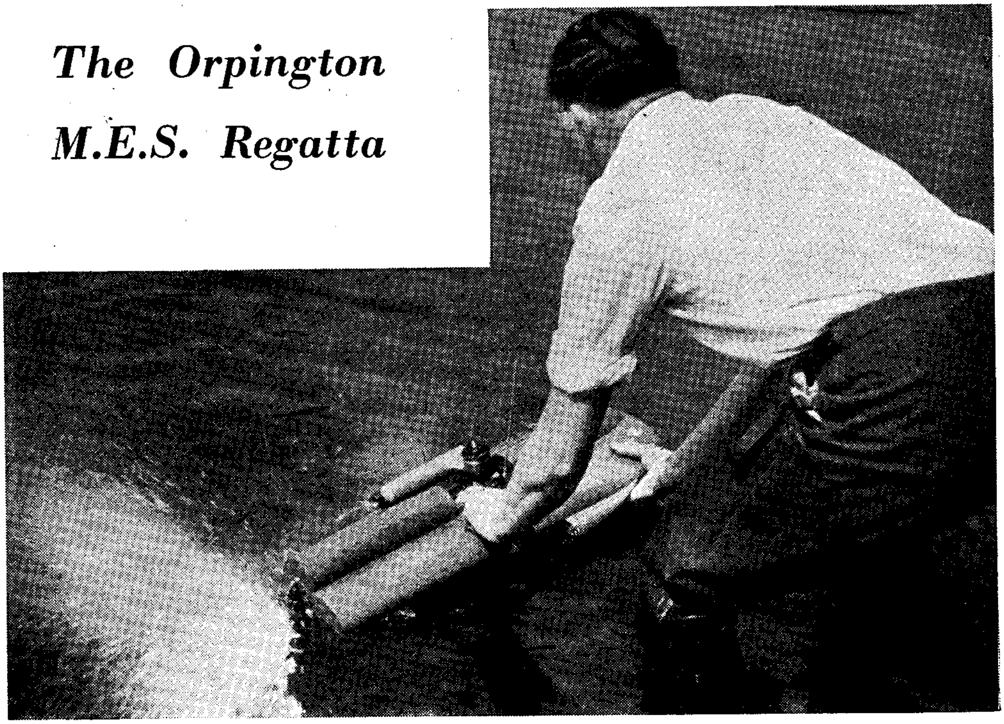


Fig. 8. Tailstock pattern

decided the best method. The result was a pattern which was my idea as to how it should be done. It was a failure ! The second attempt was better, but still a long way off what I needed. At this stage I consulted a moulder ; he told me how he would do the job. Through his advice I achieved a beautiful casting. The outside was nicely smooth and inside the skin was free of blow holes. A few remaining patterns were accomplished without difficulty, these being handwheels, pulleys and the like. No pattern was made for the bed at this stage, for I had very ambitious ideas of a welded bed with 0.4 per cent carbon steel sheers which could be flame-hardened and ground.

(To be continued)

The Orpington M.E.S. Regatta



Mr. N. Ridley (South London) with "Marie," winner of the Class "C" (Restricted) race

THE power-boat section of the Orpington M.E.S. are in the position of having no home water on which to run their boats or hold regattas, but this does not damp their enthusiasm or prevent a full scale regatta being held each year. With the co-operation of the Victoria M.S.C., this year's effort was held at Victoria Park, and a very interesting day's sport resulted.

In the course of the regatta, a new Class "B" record was set up by G. Lines's *Sparky II*; 61 m.p.h. was recorded, which makes this boat the first entirely home-produced craft officially to exceed 60 m.p.h.! It is also the first all-British boat to exceed this speed in any class.

The day commenced with the usual nomination race for the straight runners, and about 25 of these boats took part.

Once again the winner returned an all-correct nomination—some of these "straight runners" are getting quite hot at the guessing game! This time the winner was one that has not often reached the prize list, namely, G. Jones (Victoria) with *Regina*, a petrol-driven cabin launch. Perhaps this win will change his luck for the better in future regattas.

S. A. Everard, the new tug by R. Brown (Victoria), took second place, and looks like proving an excellent competition boat.

A shower of rain occurring at the end of this event prompted the officials to declare the lunch interval and, the rain soon clearing, the regatta was resumed with the speed events.

The first of these was a five-lap race for 10-c.c. hydroplanes, but having separate prizes for "C," "C restricted," and "D" class boats.

A new Class "C" boat by E. Clark (Victoria) made its appearance in this race but misbehaved badly and was eventually withdrawn without finishing the course.

J. Benson (Blackheath) managed two runs with *Moth* at about 35 m.p.h. and R. Phillips put up the best speed for the "Cs" at 43.5 m.p.h. N. Ridley (S. London), put up 36.5 m.p.h. to record the best "C" restricted speed with *Marie*.

A newcomer to regattas, J. Pinchin (Blackheath) attained 28.4 m.p.h. with his "D" Class boat *Black Widow*, and this bettered the performance of C. Hancox (Kingsmere), who recorded 25.5 m.p.h., and J. Thomas (Blackheath) *Tiz* 22.2 m.p.h.

The five-lap Class "B" race came next, and this really became a duel between F. Jutton's *Vesta II* (Guildford) and G. Lines's *Sparky II* (Orpington), the other competitors' speeds being well below the performances of these two well-known craft.

Vesta II, on the first round, recorded 51.04 m.p.h. for the distance, while *Sparky II* beat this with 54.4 m.p.h. On the second attempt, *Vesta II* most unfortunately capsized on the getaway, but *Sparky II* provided something of a sensation by recording 61 m.p.h. in a beautifully smooth run! This performance beat its own record of 58.6 m.p.h. and will be put up to the M.P.B.A. for official recognition.

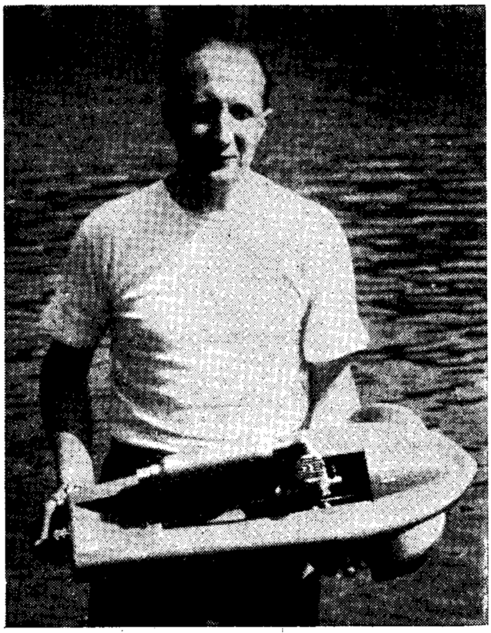
The 500-yd. Class " A " race was also exciting to watch, although the entry was fairly small. A. Cockman's latest in the line of *Ifits* recorded its first win in this race, at the very good speed of 51 m.p.h. An interesting feature of this boat is the highly efficient silencer fitted which makes the running seem quite uncanny. The flash plant of this boat, however, has never been particularly noisy. Only 0.5 sec. behind came J. B. Innocent's *Betty*, still well up to form, to take second place. E. Clark, with *Gordon* 2, recorded 45.4 m.p.h. on the first run, but failed on a second attempt and B. Pilliner's *Ginger* (Southampton), after doing a submarine act, had to be withdrawn with a mechanical failure.

The steering competition and a relay race were the final items on the programme. The former was run over a fairly short course for a change. Strangely enough, the scoring was not as good as might have been anticipated, although nearly all boats managed to hit the targets at least once.

The winning boat was G. Gable's *Piccolo* (Orpington) with 13 points (two bulls, one inner) and close behind came T. Falconer (Blackheath) and J. Mitchell (Victoria) with a score of 11 each. On the re-run, the latter scored a bull against an inner by T. Falconer.

This result marks the first win of G. Gable's steam launch, which has been running regularly in regattas this season.

An impression of Mr. G. Lines's " Sparky " (Orpington) running at over 60 m.p.h.



First place for all-home-built " C " class boats was taken by Mr. R. Phillips (South London) with " Foz "

The relay race was contested by three teams representing Blackheath, Victoria and Orpington, respectively. The Blackheath team, Messrs. Benson, Thomas and Falconer took 1 min. 32 sec., beating their nearest rivals by nearly a minute, to win the event.

Results

Nomination Race, 80 *yd.* error
1. G. Jones (Victoria) *Regina* .. Nil
2. R. Brown (Victoria) *S. A. Everard* 0.2 sec.
3. T. Falconer (Blackheath), *Golden Maria* .. .. 0.4 sec.

Up to 10-*c.c.* 500 *yd. Race*
" C " Class prize, R. Phillips (S. London), *Foz* .. .. 43.5 m.p.h.
" C " restricted prize, N. Ridley (S. London) *Marie* .. .. 36.5 m.p.h.
" D " Class prize, J. Pinchin (Blackheath), *Black Widow* .. 28.4 m.p.h.

500 *yd. Class " B " Race*
1. G. Lines (Orpington) *Sparky II* 61 m.p.h.
2. F. Jutton (Guildford), *Vesta II* 51.04 m.p.h.
3. N. Hodges (Orpington), *Sparta* 34.3 m.p.h.

500 *yd. Class " A " Race*
1. A. Cockman (Victoria) *Ifit* 7 51.04 m.p.h.
2. J. Innocent (Victoria) *Betty* .. 49.8 m.p.h.
3. E. Clark (Victoria) *Gordon* 2 45.4 m.p.h.

Steering Competition
1. G. Gable (Orpington) *Piccolo* 13 pts.
2. J. Mitchell (Victoria) *Glen Helen* .. .. 11 pts. + 5
3. A. Falconer (Blackheath) *Golden Maria* .. .. 11 pts. + 3

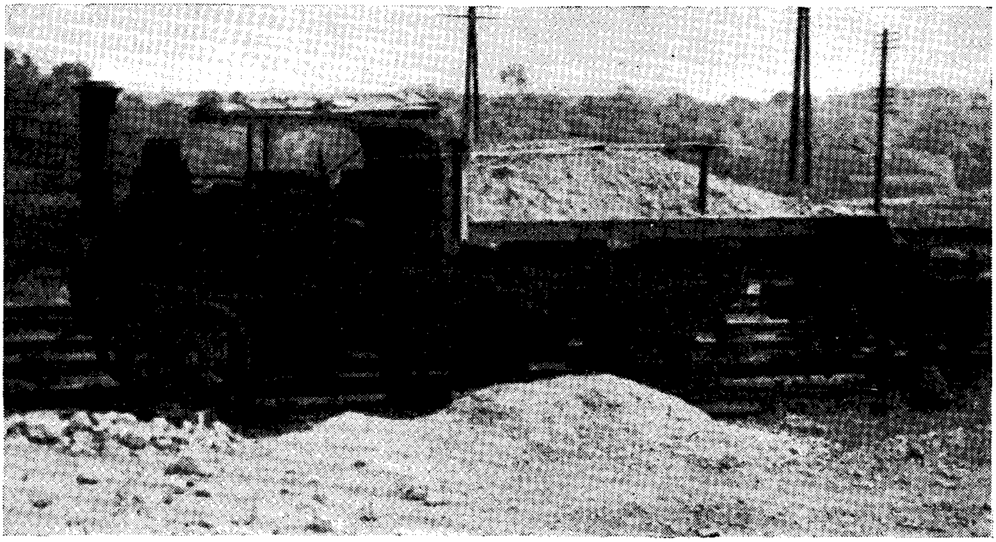
Relay Race
1. Blackheath
J. Benson, *Comet*
J. Thomas, *Rose*
A. Falconer, *Golden Maria* } 1 min. 32 sec.

"L.B.S.C.'s" Lobby Chat

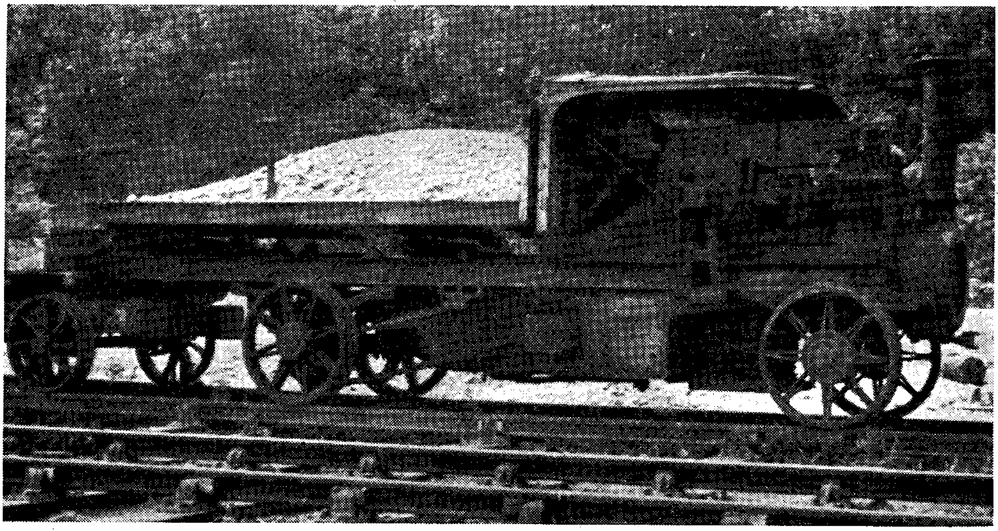
What Became of the Steam Wagons?

As our older readers will doubtless recall, in the early years of the century, one of the familiar sights in the streets of the larger towns in Great Britain, and on the main country roads, was a steam wagon puffing cheerily along, often hauling a heavily-loaded trailer. My old home at Norbury, on the main Brighton road just south of Norbury Station—L.B. & S.C. Ry. as it was then—was on a gradient, and we could always tell, by the sound of the exhaust, whether it was a Foden, Sentinel, Yorkshire or what-have-you that was chugging stolidly "up the bank." These wagons were cheap to run, reliable, efficient, and above all, used home-produced fuel; and their use was rapidly extending when, alas, they received their death-warrant! You have all probably heard the story of the king who told his "Gestapo" to go out and see what the people were doing, and stop them doing it. The government of the day did practically the same thing with the steam wagons. Whether they thought to extort the last farthing from the owners, or whether they were influenced by the complaints from the oil companies, that sales were falling off, owing to the reduced demand for petrol and oil, are matters that do not concern us; what does, is that a crippling tax was imposed on the steam wagons, and they disappeared from the roads almost overnight. Showmen's and other owners' traction engines followed suit. It was a bitter blow for both users and manufacturers; I had first-hand experience of that, because a friend in the haulage business, who was always more interested in steam than "infernal combustion" as he called it, had just replaced six worn petrol lorries with six new Sentinel steam wagons, when the tax blow fell. It nearly put him in the bankruptcy court; he could not afford the tax from his modest profits, and the six wagons were unsaleable. He made a fresh start with one solitary petrol lorry, driving it himself, and it was years before he really got going again. As to the manufacturers, all they could do was to scrap their entire production schedule, and switch on to internal combustion work; there were several who failed to make the new grade, and dropped clean out. At the time, the coal trade was in a state of depression; and the cessation of orders from the steam wagon folk knocked it a couple of rungs farther down the ladder. The only people who benefited, were the oil importers.

I have often heard the question put, as to what became of the displaced steam wagons, and should imagine that most of them were just broken up and sold as scrap. I know personally of one that was just parked by the side of a main road, and stood there for years, gradually rusting and rotting away, like the two little Brighton "Terriers" at Edge Hill. However, there were a few survivors, and by the kindness of Mr. P. T. Atkinson, I am able to illustrate one that took to the iron road, after it was driven from the tarmac and paved varieties, thus escaping the tax blow altogether; and it didn't even need a number and a licence in its new sphere of activity, which was hauling loads of limestone from a quarry to the kilns. The photographs were taken about 18 months ago, between Darlington

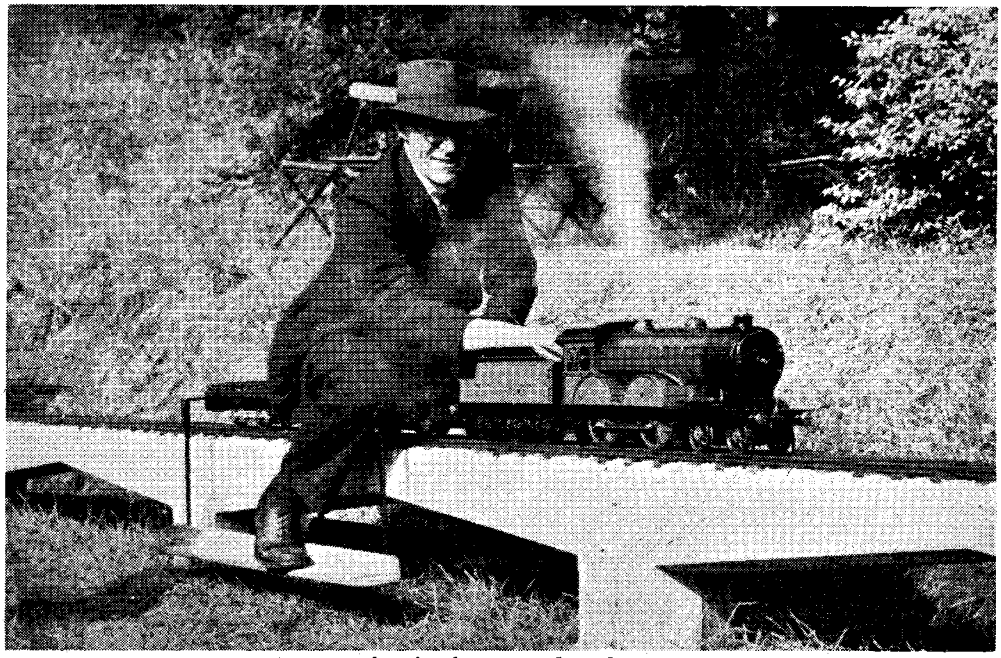


No licence needed on this job!



A new lease of life—a road wagon on rails

and Aycliffe, alongside the main Darlington-Newcastle line of the L.N.E.R. An old single-wheeler, and a 2-2-0 at that, is somewhat of a novelty as a mineral-hauling locomotive! Both sides of the wagon are shown, in case anybody would care to build a small replica, just for the novelty of it. On $3\frac{1}{2}$-in. gauge, it would only need a very small engine and boiler, a pair of loose eccentrics doing the needful for steam distribution; and being geared down by a combination of spur-wheels and chain, it would be powerful enough to haul an adult. Putting plenty of load on, to prevent slipping, would be quite legitimate! In fact, by putting the driving axle on ball bearings, the driver could actually sit on the wagon body. By virtue of the gearing, the speed would never become high enough for derailment. If a steering-gear were fitted, and interchangeable wheels, the little wagon could be made to operate either on road or rail. I would gladly give a few suitable details, should there be any demand for them.



A pair of very good workers

Further Notes from the North East Corner

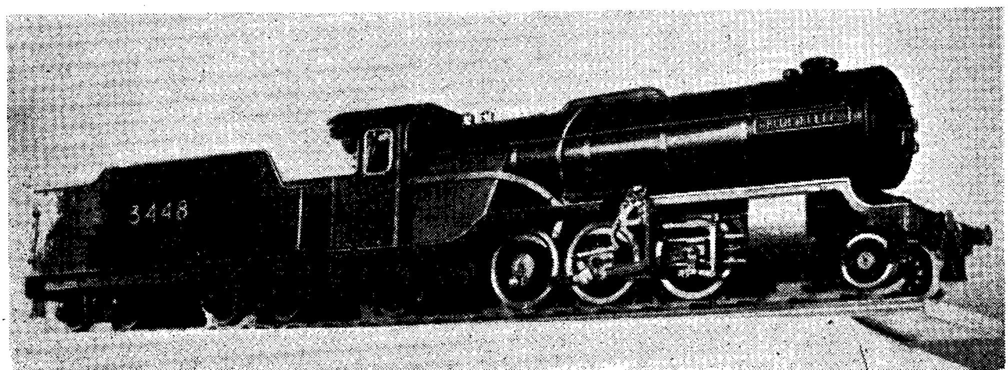
Mr. Atkinson kindly included some further pictures, which are reproduced here. One of them shows Mr. H. T. Swaine driving his 3½-in. gauge N.E.R. class "R" engine, built to the drawings and instructions I gave for *Miss Ten-to-Eight*. Mr. Swaine was the founder, and for many years chairman of the Sunderland club, and is a red-hot Live Steamer; and during the summer months, his engine can be seen hard at work on the club track at every fine week-end. She has had one bad wreck; when hauling a test load of over 6 cwt. of lead bars at about 12 m.p.h. she ran off the road, and performed an excellent reproduction of a full-sized smash. The boiler was knocked back half-an-inch or so, and the cab and upper works badly damaged, but the chassis wasn't hurt, and the builder said it speaks well for "L.B.S.C." chassis design, for which compliment your humble servant bows gracefully!

The 2-6-2 is a bit of a mixture, and is a 2½-in. gauge job. Her general outline suggests that she is a relation to *Green Arrow* and *Bantam Cock*; but she has the bracket-type Baker valve-gear, a cab that is rather Swindonish, and a flat-sided tender with the American type (Bettendorf-Andrews) bogies. However, the net result isn't displeasing, by long chalks; and she does the doings all right. The other photograph shows the beginning of one of the North Eastern "T" class 0-8-0s which, all being well, I shall soon be describing in 2½-in. gauge; this one is 3½-in. gauge. Mr. Atkinson is responsible for both jobs. The 0-8-0 will be interesting, as our friend believes in doing a bit of designing for himself; and in the present instance he is adapting the valve gear of my 3½-in. gauge "County" class G.W.R. 4-6-0 to the North Eastern engine, using cylinders of the type I described for *Maisie*, but with bigger steam chests. The castings for these were made from his own patterns. Incidentally there was a misprint in the wheel size given in my recent lobby chat; the diameter of the driving wheels should have read $2\frac{7}{16}$ in. instead of $2\frac{1}{16}$ in. This was apparent to most folk, as it was obviously out of the question to use 2½-in. diameter wheel castings for turning down to the small size given in error; however, I thought it advisable to draw attention to the matter, as misunderstandings are easily made. For instance, a courting couple were wandering one night down a country lane, as the moon rose over the hill. "Isn't it lovely?" said the girl. "It certainly is," said the boy-friend; and then, noticing that the moon had just passed the full phase, added: "but it's waning." "Don't be silly," said the girl; "why, I haven't felt a drop, and besides, there isn't a cloud in the sky!"

A Slipping Puzzle Explained

A correspondent who built a very successful engine as a first attempt, and is delighted with its performance, has put a query which I have often heard argued out in full-size lobbies in days gone by; and in case any other beginners are puzzled, maybe a few words right here and now, would ease their minds. Our friend has an up-and-down line about 60 ft. long in the usual suburban back garden, and it is level, as near as makes no odds, from end to end. He says that the engine will start a good load in forward gear without the ghost of a slip; but when he reverses to come back, she spins like a buzz-saw unless the regulator is carefully handled. At first he thought it was the line, and tried running the other way, with the locomotive heading toward the house instead of away from it; the result was the same. Then he thought that pushing the load might be a more laborious job than pulling it (he says he tried it personally with the garden wheelbarrow!) and so he coupled up the engine to run tender first, with a passenger on the car, whilst he walked beside her and operated the regulator. No difference! The engine pushed the load without slipping, but slipped when pulling it, and he says he is stumped. Does every engine have this tendency, and if so, what is the cause?

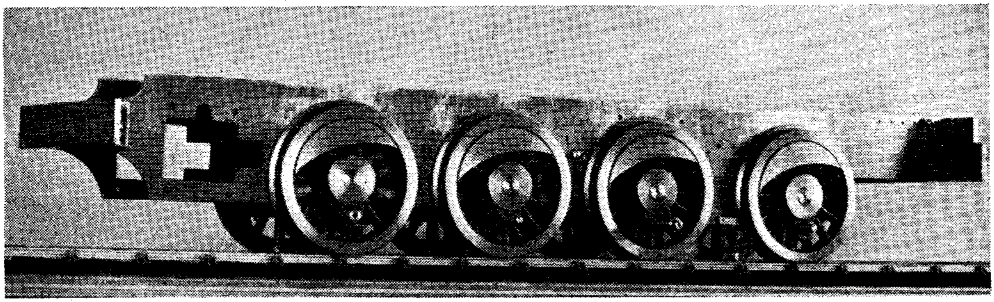
Like many other things, it is just one of Nature's little antics. Big engines will do precisely the same, especially if the cylinders are inclined. The old single wheelers were the worst offenders, and four-coupled engines are also affected to a lesser extent. With a six-coupled engine, it would only become apparent when shifting a heavy load. We used to notice it sometimes when shunting a long line of wagons



Mr. Atkinson's 2½-in. gauge "Blue Belle"

at Willow Walk, Norwood Junction, and other goods depots. Little engines will do it any time, if the driver is ham-fisted with the regulator. The explanation is simple. Take a look at the crankpins of an outside cylinder engine when she is moving slowly, and note the pull and push of the connecting rods. It won't take you long to realise that when the engine is running forward, and the pressure of the crossheads is taken by the top guide bars, the tendency is for the big-ends to press the crankpins downwards, thus adding to the adhesion. On the bottom half, when the piston-rod and connecting-rod try to double up like a pocket knife, crosshead thrust is up, and big-end thrust down. On the top half, when the rods try to pull into a straight line, the pressure on the pin is still downwards, as the pin is above cylinder centre.

When the engine is reversed, and the cross-head pressure is taken by the bottom bars, the action is reversed, the big-ends trying to push the crankpins up on the top half of the movement, and pull them up on the bottom half. Consequently, the lifting action reduces the adhesion; and the same steam pressure that would start the engine forward without slipping, would make her "lose her feet" when in reverse gear, the lifting action reducing the "bite" between wheel tread and railhead. This is, of course, "all wrong" according to "the book," nevertheless it is exactly what actually happens; I have experienced it with both big and little engines.



The start of a North Eastern T1

Slipping With Steam Off

Talking about slipping, I should imagine most readers have heard the tale that some engines will slip violently with steam shut off, especially in damp tunnels, where the rails are perpetually slippery. This is true—but the slipping is not in the way usually associated with the engine slipping, that is, the wheels spinning on the rails. The slipping is what our "precise" friends would probably term "negative slipping," being very fond of the word "negative"! I found this out, in the far-off days of long ago, by actual observation. One of our engines had a reputation for slipping like old Harry in a damp tunnel, when steam was shut off. As was usual, in those days, she had ordinary flat slide-valves, and no snifting valve. I was only a young fireman at the time, but as luck would have it, was one day booked to this particular engine on a run which took us through the tunnel. Here, thought your humble servant, is a chance to do a bit of Sherlock Holmes; so when we approached the tunnel, I took the torchlamp, went out on the running-board, and crouched by the side of the driving splasher to see what happened.

Sure enough, when my mate shut the regulator to coast down the grade, there was the familiar sound of slipping wheels, and the quivering of the engine; *but the slipping was caused, not by the wheels spinning, but dragging*! The slide valves were between the cylinders, practically touching back to back, so could not fall clear of the port faces; and as they were a proper fit on same, and the engine had no snifting valve, there were no means of destroying the vacuum created by the pumping action of the pistons, for part of each stroke. The friction between the damp rails and the wheel treads, was not sufficient to overcome the retarding effect of the vacuum in the cylinders, hence the dragging. The trouble could not be diagnosed from the footplate, for this reason. Normally, the wheels roll on the rails at a given number of revolutions per minute, according to the speed of the engine. The part of the wheel tread in contact with the railhead *is always stationary*; that sounds like one of Pat's observations, but it is nevertheless actual fact—try it with your little engine. If the wheels move *faster* than the given speed, slipping takes place, the wheel tread moving in a forward direction on the railhead. If the wheels move *slower* than the given speed, slipping still takes place, the wheel treads moving in a backward direction on the railhead. It doesn't matter a Continental whether the slipping is faster (spinning) or slower (dragging), the engine will quiver, and the "feel" on the footplate is just the same.

The Clue

What put young Curly on the track of the culprit? "Simple, my dear Watson," as Sherlock would have said. In some of the Brighton running-sheds, they had a playful little trick of "running an engine for steam," in cases of emergency where an engine was needed in a mighty hurry. The yard pilot (depot shunting engine) would couple on, and run the dead engine up and down any bit of road available in the depot. A cleaner boy, or a firelighter, or anybody who happened to be available (I did

it plenty of times) rode on the footplate, and kept the reversing gear in the opposite direction to which the engine was running, so that air would be pumped into the boiler, to work the engine's own blower. It would have been a bit too much like work, to do it with a tyre pump, though we didn't mind work in those days!! Anyway, when acting as reverser-in-chief, on several occasions I noticed that when the air pressure in the boiler began to rise, the wheels would drag, if they ran over a greasy place in the rails; and I also noticed that when they did so, the sensation on the footplate was exactly the same as when slipping with steam on. That gave me the clue, and led to the solution described above. One can learn plenty by keeping one's eyes and ears open!

A Walschaerts Argument Settled

A couple of readers whom we will call Urbanus and Iconoclast, because their mums didn't think of it first, have submitted the following dispute to the Curly Arbitration Tribunal, and have agreed to abide by the findings and decision of same. 'Erb says that the full gear travel of a valve (piston or slide, doesn't matter which) actuated by Walschaerts gear, is equal to the movement imparted to the radius rod by the die-block in the expansion link, plus the movement effected by the action of the combination lever. Ike says, nothing of the sort; he claims that the full-gear travel is controlled by the die-block in the link, and all the combination lever does, is to advance the valve a sufficient amount of that travel, to open the port to lead, without adding to the travel at all. 'Erb tries to clinch his argument by saying that when the die-block is in mid-position, the combination lever is still moving the valve spindle an amount equal to twice the lap and lead, and therefore any movement imparted by the die-block must of necessity be added to the movement imparted by the combination lever. Well, 'Erb, old son, Curly is sorry to cattle-up your illusion, but Ike is correct. There is just one thing 'Erb overlooks, and it is just that one thing that makes all the difference. Let's do a bit of analysis.

'Erb is, of course, perfectly correct in pointing out that when the dieblock is in the middle of the link, and the radius rod stationary, the combination lever moves the valve sufficiently to open the ports to lead, at each end of the movement; *but*—and this is the rub—the pin on which the combination lever is pivoting, is also quite stationary, and the angle of the combination lever, as it swings back and forth, is the same on both sides. Now when the dieblock is at top and bottom of the oscillating link, we have a different state of affairs altogether. At one part of the movement, the fulcrum pin is ahead of the centre-line of the combination lever, and at another part, it is behind it; consequently, the angles to which the combination lever will swing, are governed by this movement, and instead of the swing of the combination lever being exactly symmetrical, as it is in mid-gear, it suddenly tips first one way and then the other, as the pivot pin moves; and the valve darts backwards and forwards in spasms.

What the combination lever actually does, and what Egide Walschaerts intended it to do, is to advance the valve to the lead position, irrespective of the position of the dieblock in the link, at the beginning of the stroke. It doesn't add to the full gear travel at all, as you can see for yourselves by measuring the movement of the pivot pin which connects the radius-rod to the combination lever, and comparing it with the valve travel. Turn the wheels by hand, and watch closely the movement of the top of the combination lever on an ordinary slide-valve engine. As the piston starts on its outward stroke, the pin in the combination lever which is connected to the valve spindle, is leading; but as the piston reaches half stroke, the combination lever reverses its movement, and the angle at the top begins to change. As the return crank is at right-angles to the main crank, at half stroke the dieblock is momentarily stationary, the radius rod being ditto; and the combination lever then takes charge and advances the valve on the return journey, enough to open the opposite port to lead when the crank arrives on the dead centre. As the crank passes the dead centre, the further movement of the expansion link and dieblock, acting through the radius-rod, opens the port to the required amount.

The point that 'Erb overlooked is, that the reversal of the valve movement takes place *before the crank arrives at dead centre*, and the paths of the radius-rod pin and the valve-spindle pin have crossed during the reversal. If the combination lever movement were added to the radius-rod movement, the pins wouldn't cross. I've just checked it off on one of my own engines; and in full gear, the movement of the dieblock, and consequently of the pin connecting the radius-rod to the top of the combination lever, is the same as the valve travel. The combination lever simply reverses the movement of the valve, at each end of the stroke, sufficiently to open the valve to lead, without adding to the valve travel at all. It is just the same with an engine fitted with Baker valve-gear. On *Tugboat Annie*, which has a special arrangement of setting for the valves and valve-gear, the valve movement exceeds that of the pin connecting the valve-rod between bell-crank and combination lever to the latter (corresponding to the Walschaerts radius-rod pin) by the amount of the lead only, and not by the whole of the lap-and-lead movement of the top of the combination lever. I gave her an extra long travel, as the outside valve-gears have to drive the inside Holcroft conjugation as well, and I wanted her to retain plenty of travel, and consequently accurate valve events, even if she wore badly; but she hasn't.

If friend 'Erb takes one of my Walschaerts valve gear drawings, and makes it up to about four times the size, with pieces of cardboard, and some paper-fasteners, drawing-pins or anything else suitable, he will learn more about the behaviour of valve-gears, in a few minutes, than can be learned from hours of text-book study; and I earnestly commend all beginners, or anyone else who is at all hazy on the subject of valve-gears, to follow suit. I always make up experimental dummy gears, when trying anything fresh; and that is why "L.B.S.C." engines always do the job!

Detail Traction-Engine Blueprints

The "Allchin-M.E." $1\frac{1}{2}$-in. Scale G.P. Traction Engine

by W. J. Hughes

SINCE the publication of my series* of scale drawings of prototype traction-engines, I have had numerous enquiries about *detail* drawings—in fact, from the tone of a recent letter, I judged that the writer thought a full set of such drawings could be knocked off in a night or two! This is far from the truth, of course, for although in many respects the steam-engine is a comparatively simple machine, there are still many dozens of individual drawings to be prepared for the production of a locomotive of any kind, rail or road.

It will be obvious, therefore, that one could not undertake the simultaneous production of detail drawings for several prototypes, especially as a spare-time occupation, and a choice would have to be made between the claims of the various types—tractor, general-purpose traction-engine, or lordly road-locomotive. This done, it would be necessary to choose a definite prototype to copy, for the average model engineer does not like the idea of a hybrid, and rightly so.

Neither choice proved an easy task, but eventually I picked on the Allchin general-purpose traction-engine. The chief reason was perhaps that I am building this engine myself; this means that as and when snags crop up, they will be spotted (I hope) and put right. Other reasons are that the engine is a good-looker, that I am very familiar with the full-sized engine, having spent many happy hours with her, and that I have many excellent photographs (including close-ups of various parts) which were taken especially for my book *Traction Engines Worth Modelling*, in which the prototype is fully described, by the way. In addition, the engine is single-cylindered, which means less complication in the motion and gearing.

Of course, this choice will not meet with everyone's approval, but then what choice would? Later on it may be possible to work out the details for other prototypes—I have a fancy for a Fowler showman's road locomotive myself—but for the time being the Allchin will hold the stage.

The Choice of Scale

The scale was not difficult to choose, for I had long since decided that $1\frac{1}{2}$-in. scale was the ideal for the average builder.

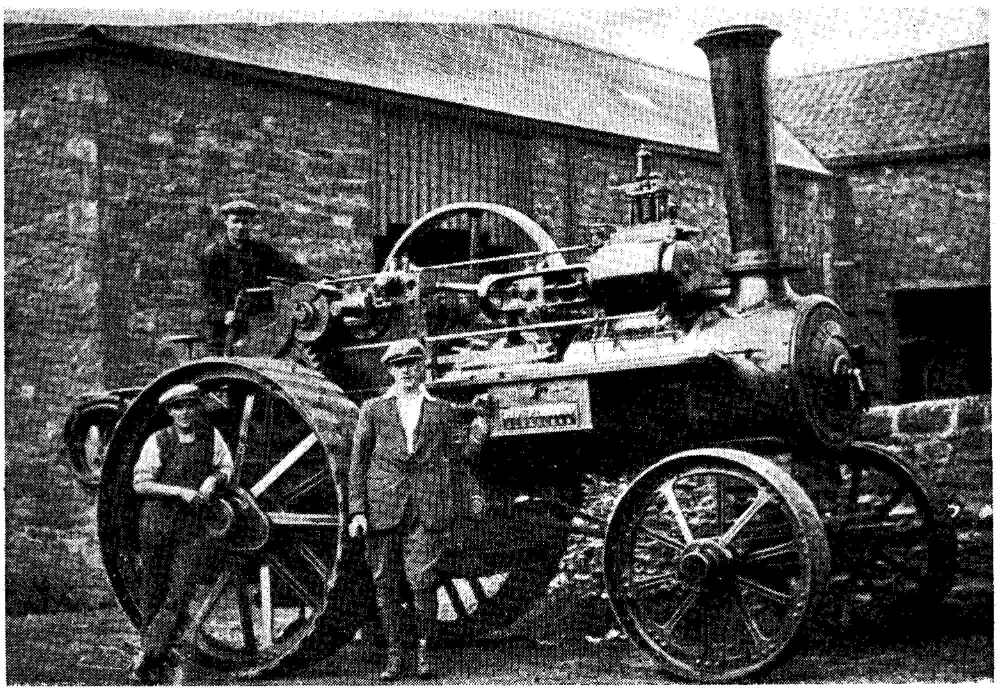


Photo by courtesy] [*John G. Earnshaw*

Allchin No. 3251 "*Royal Chester,*" *which is the prototype chosen by the author for the new series of detailed* $1\frac{1}{2}$-*in. scale blueprints*

Inch-scale means fiddling detail, and a boiler that is not easy to keep in steam, while the power is inadequate when it comes to hauling live passengers. So is the adhesive weight on the hind wheels, by the way! The next size, 1¼-in., suffers to a lesser extent from the same troubles, though the haulage-power is considerably increased.

In the larger sizes, 2-in. scale is beyond the resources of the chap with the 3½-in. centre lathe, for the hind-wheel rims are too big to be machined; as for 3-in. scale and up, these must remain pipe-dreams to most of us, if only because of the weight and size.

But in my opinion, 1½-in. scale is just right. The hind-wheel tee-rings can be machined in the gap of a 3½-in. lathe; the boiler, at 3⅞ in. diameter, is not too large to handle, yet is not difficult to keep in steam; and with a weight of perhaps 60 lb., the whole engine is not too heavy to be transportable. As for haulage capacity, this will be ample for most purposes.

Another tempting advantage, to the designer at least, is that in this scale, every inch is represented by ⅛-in., which makes it *much* easier to reduce full-size dimensions to scale than messing about with twelfths or twenty-fourths!

So 1½-in. scale it is, and those who wish to work to larger or smaller scales will have to do the necessary colly-fobbling themselves, as no doubt, they will!

Castings and Supplies

Just as many model engineers do not want the task of working out their own details from the full-sized job, neither do they want to make their own patterns or find a foundry to undertake the casting, and this is quite understandable. I am therefore making arrangements for castings to be available, and the source of supply will be announced in due course.

Gearing is another problem to some, and here again steel spur gears *of scale appearance* (important, that!) will be available. In connection with gears, the problem of the supply of bevels for differential or compensating gear seemed likely to prove difficult, for so far as one could ascertain, there were none of suitable size on the market, and it would be necessary to have them cut specially. On asking for quotations from firms specialising in this type of work, the prices quoted varied considerably; but even the lowest was beyond the reach of most of us.

An alternative source of supply would therefore be necessary for those who did not want to machine their own bevels, and for a while I toyed with the idea of buying a couple of hand-drills, removing the bevels, and throwing the rest away! The next step was to approach one of England's largest tool manufacturers to see if we could acquire the necessary wheels without having to buy the rest of the hand-drills Here I met with complete co-operation, but also with a snag. The fact is that the cutting of the teeth of these wheels is one limiting factor in the production of the complete drills; but even so the firm was prepared to allocate a *limited* number of wheels for our purpose. That word *limited* was the snag. Another factor to be considered was that the diameter of the hand-drill wheels was larger than scale, and this would have necessitated enlarging the winding-drum to suit.

Then came one of those ideas which are so simple that one wonders why the dickens they didn't arrive before. A quick search through back volumes of THE MODEL ENGINEER, and—yes, there we are: just the ticket! The differential gear of the "M.E." road roller uses bevel wheels and pinions which are just what we require, though the "spider" or compensating centre will need some alteration. So off went a letter to the suppliers to see if these wheels are still available, and in a day or two came an affirmative reply—another problem settled.

Alterations in Design

As with most models designed to do a job of real work, certain modifications are necessary. For example, as even the veriest tyro knows, the boiler flue-tubes must be enlarged in diameter, some fittings must be modified and so on. At the same time, I firmly believe that when one models a definite prototype, the finished model should look *as nearly as possible* exactly like the original—in other words, that where internal alterations are carried out, the external appearance should remain true to shape and appearance, if at all possible.

In some instances it is necessary to vary the method of *construction* from the full-sized job—in our case, the wheels may be quoted as an example. On the prototype, the spoke-centres are cast into the hubs, but since this method would be beyond most builders of small sister, we shall use an old and well-tried method of fabricating the hubs.

Again, the cylinder of the large engine has steam passages cored and cast in, but we shall have to use a certain amount of fabrication to simplify the job both for the foundryman and for ourselves.

Our particular prototype, Allchin No. 3251, is sprung on both axles but on the model I am specifying springing on the front axle only. On the hind axle, the scale movement would be only $\frac{1}{16}$ in. in any case, and would involve the cutting of special gears with specially made cutters, so I judge that few builders would want this additional complication.

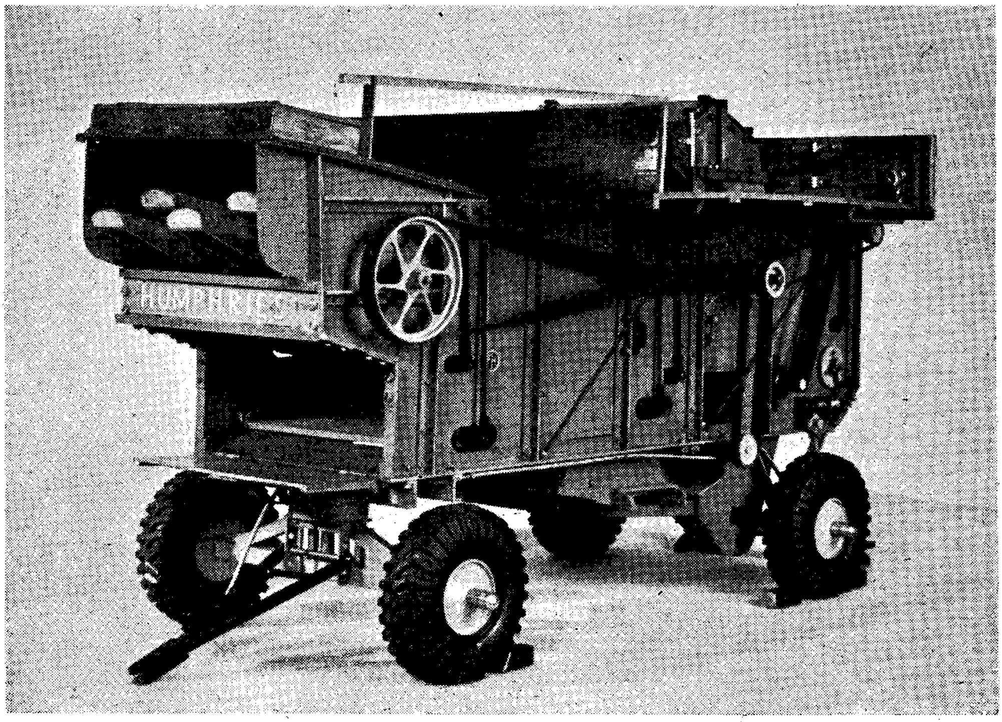
Description and Photographs

As has been mentioned, the prototype engine is described and illustrated in my book, just out, but the editor has approved the idea of a serial description in these pages of the building of the model Allchin. We shall use photographs of the big engine, and also of the various bits and pieces of the small one. Where special machining set-ups are necessary, these will be described, and illustrated if need be, and all along it will be borne in mind that the average model engineer does *not* have access to more than a lathe and drilling-machine. (I know, because I'm one of 'em!) So far as possible, the drawings will be checked and rechecked before tracing, but because of human fallibility, errors may creep in occasionally. If so, I should be glad to hear of any that readers may discover.

(Continued on next page)

A MODEL THRESHER

by K. L. Hebden



THE photograph shows a model thresher that I have recently completed. The idea of this model was thought of when I was working on a farm in Germany as a P.o.W. during the last war.

The model has taken 18 months of spare time, and is a copy of Messrs. Fisher Humphries' all steel S.F.A.I. machine.

A brief specification is as follows :—

It is approximately 24 in. long, and 8 in. wide over the frames. Brass angle was used for the main frames, and aluminium sheeting to the sides. Tyres were purchased from Messrs. Bassett-Lowke.

The whole working mechanism runs on $\frac{1}{8}$ in., $\frac{1}{4}$ in. and $\frac{3}{8}$ in. ball-bearings, which I obtained from a "bombsight computer." Most of the other parts were fashioned up from "junk" around the workshop and house. The belting is rubber $\frac{1}{16}$ in. $\times$ $\frac{3}{8}$ in., and the top boards are $\frac{3}{16}$ in. wood obtained from Messrs. Hobbies.

The model works well, being driven, from a 27-volt motor from the same aircraft junk.

It has been exhibited by our local agricultural implements firm, Messrs. Stanhay Ltd., at the Kent Agricultural Show, and ran without trouble throughout most of the two days.

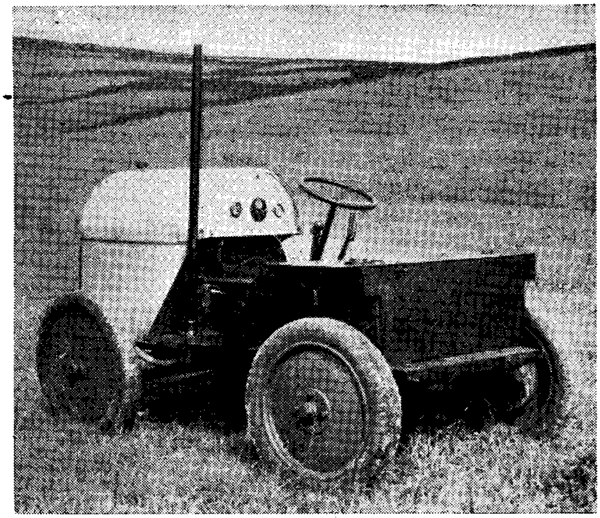
DETAIL TRACTION-ENGINE BLUEPRINTS

(*Continued from previous page*)

Blueprints will be published from this office as and when they become available, and Sheets 1, 2 and 3 are now ready. Sheet 1 covers the tender and tender accessories, Sheet 2 covers hornplates and bearings, and Sheet 3 the gearing and shafts. Other sheets are beyond the preliminary stages, too, but I would ask readers not to write and ask such questions as "When will cylinder and motion be ready?" or "When will boiler details be available?" For the answer is bound to be indefinite, depending on such factors as how frequently I can get away with *not* mowing the lawn or cutting the hedge, and similar unpredictable things!

A 7-h.p. Farm Tractor

by L. Kirkham



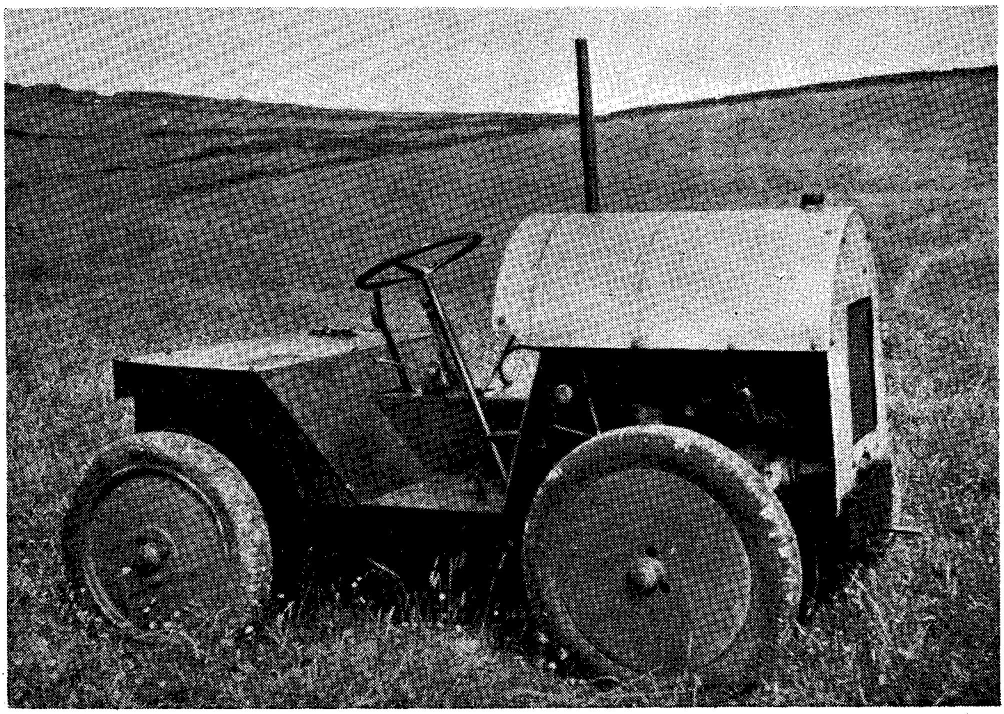
THE tractor illustrated in the accompanying photographs is entirely home made, without a workshop of any kind. Hand tools were used throughout and these were few in number, consisting of hammer and chisel, hacksaw, files, a breast drill and an anvil.

The frame is made from two lengths of very heavy Anderson air-raid shelter steel U-section, and the engine is a 1933 Austin 7 with three-speed gearbox. A second gearbox is also fitted, a heavy four-speed model taken from an old Austin 16.

One of the most tedious jobs was the construction of the front wheels. The discs were cut, by hammer and chisel from $\frac{1}{8}$ in. mild-steel sheet, on the anvil, and all holes were drilled with the breast drill. The thickness of other material used for construction ranged from $\frac{1}{8}$ in. to $\frac{1}{2}$ in.

The tractor has a very small turning radius; in fact, it would turn on a large table top, and is a great asset to mowing, being capable of handling a heavy two-horse mowing machine with plenty of power to spare.

This is the second 7 h.p. tractor I have made, the first being relegated to my parent's farm, where it is still giving unfailing service; even to pulling heavy tree trunks, two at a time!



IN THE WORKSHOP

by "Duplex"

No. 73.—*A Small Power-driven Hacksaw Machine

NOW that the driving gear has been completed, the construction of the parts forming the saw guiding mechanism will be described.

The components which make up this mechanism are illustrated in Figs. 24 and 29, and their relationship should be made clear if the two photographs are examined together. The main member of the mechanism is a beam, pivoted on a vertical pivot arm and carrying the saw frame slide or carriage. A vertical guide arm secured to the baseplate serves to give additional support to the projecting portion of the beam towards its centre.

Besides these, a catch is fitted to the beam to support it when the saw is lifted from the work; also, a weight for loading the saw blade is carried on a weight-shaft attached by brackets to the top of the beam.

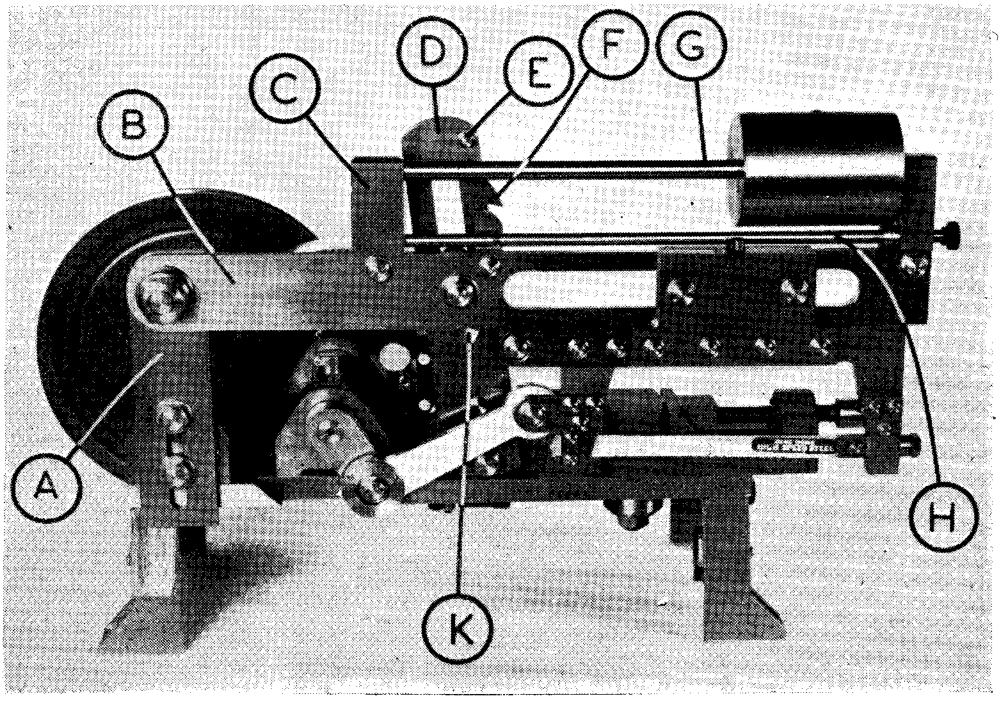


Fig. 24. *A—Beam pivot arm; B—Beam; C—Weight shaft bracket; D—Beam guide arm; E—Latch pin; F—Beam catch; G—Weight shaft; H—Catch control-rod; K—Stop-bolt*

The Beam

This is made from a length of flat mild steel, $1\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. thick. As this part forms a slide for the saw carriage, it must be both straight and flat, and, if any irregularity is found on testing on a surface plate, the material should be filed and scraped true and to a good surface finish. Next, the work is marked-out in accordance with the drawing, Fig. 25, and the pivot bearing hole is drilled and reamed. The long slot can be formed either by an end-milling operation in the lathe or by drilling and filing; the surplus metal may be removed with the hacksaw by passing the blade through a drilled hole.

The sides of the slot should be finished parallel, and its width should just allow the ball bearings fitted to the carriage to slide freely.

The Beam Pivot Arm

As will be seen in the photographs, this part is attached to one end of the countershaft bracket

*Continued from page 460, "M.E.," September 21, 1950.

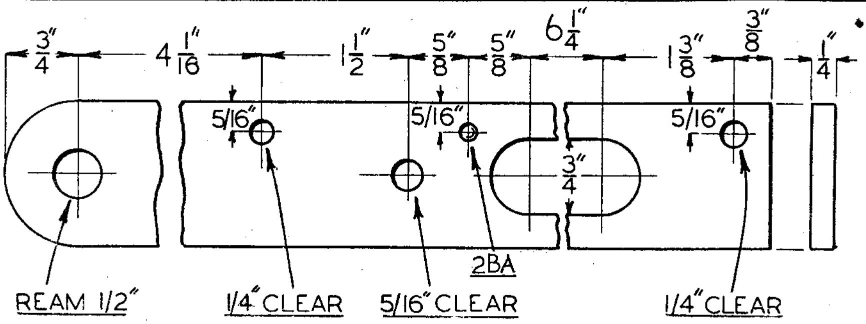


Fig. 25. The beam

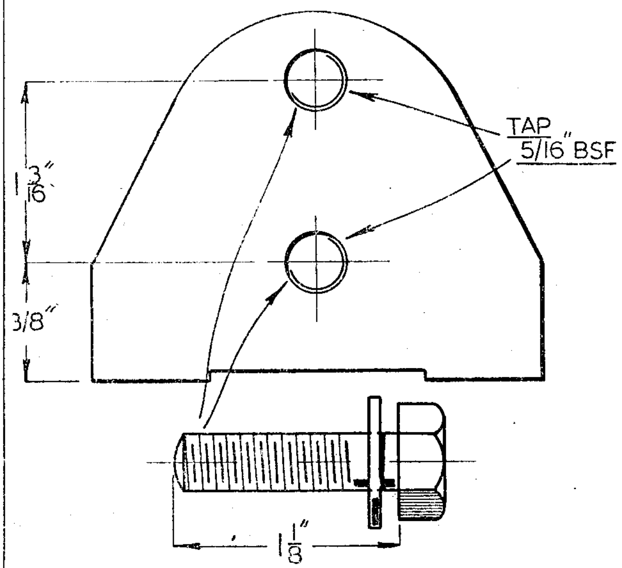
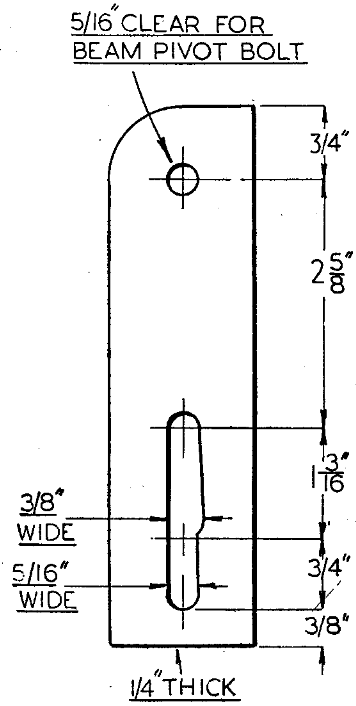
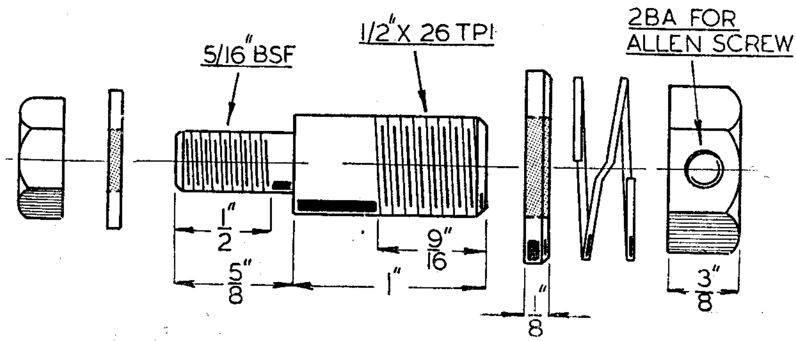


Fig. 26. Beam pivot arm bracket



Above—Fig. 27. Beam pivot arm



Left—Fig. 28 Beam pivot-bolt

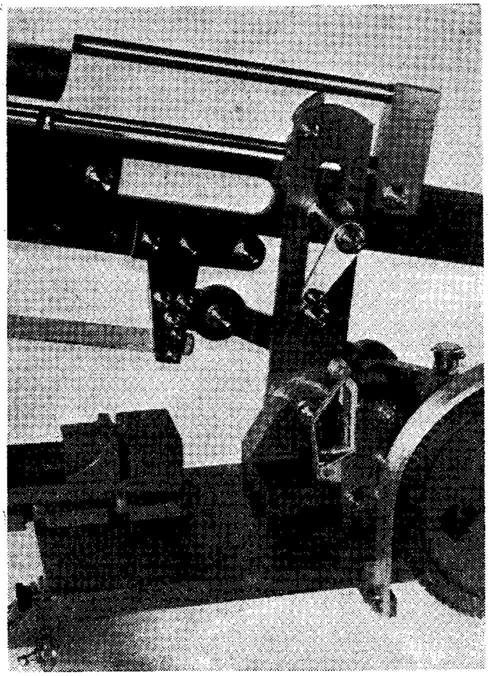


Fig. 29. Beam guide arm assembly

by means of two hexagon-headed screws, located as in the drawing, Fig. 26.

The arm is slotted, in accordance with Fig. 27, to allow the beam to be raised when parallel sawing at some distance above the vice base is required. In addition, this slot is widened towards the middle of its length to enable the arm to be swung for adjusting the position of the saw carriage ; this may be found necessary to keep the carriage clear of the ends of the beam slot when the beam is fully raised. As will be seen in several of the illustrations, the shouldered pivot for the beam is bolted to the beam itself, and a double-coil spring washer and nut provide the clamping pressure. If a circular disc of thin sheet fibre or plastic material is fitted between the two contact surfaces, this will provide some measure of frictional control of the pivot joint, which will then act in the same manner as a car shock absorber in damping out any sudden movement of the beam as the saw blade travels over the work.

The Guide Arm

This arm is attached to a bracket casting bolted to the baseplate of the machine as illustrated in Fig. 29.

After the casting has been machined on all flat surfaces, it is drilled and tapped in accordance with the working drawing in Fig. 30. This casting also serves as a mounting for the automatic cut-out switch, and at this stage the holes for the switch fixing screws can be drilled and tapped. As will be seen in the drawing, the holes for the bolts securing the guide arm lie at an angle to the vertical ; in this way, the guide arm is set at an oblique angle of some 7 deg. to enable its slot to conform more nearly to the radial travel of the guide shaft fitted to the beam. Should this description be found difficult to follow, it may, perhaps, be clarified by reference to Fig. 29. The guide arm is slotted to allow the guide shaft to rise as the beam is raised ; the bolting hole at the foot of the arm is also slotted so that the arm can be swung to conform

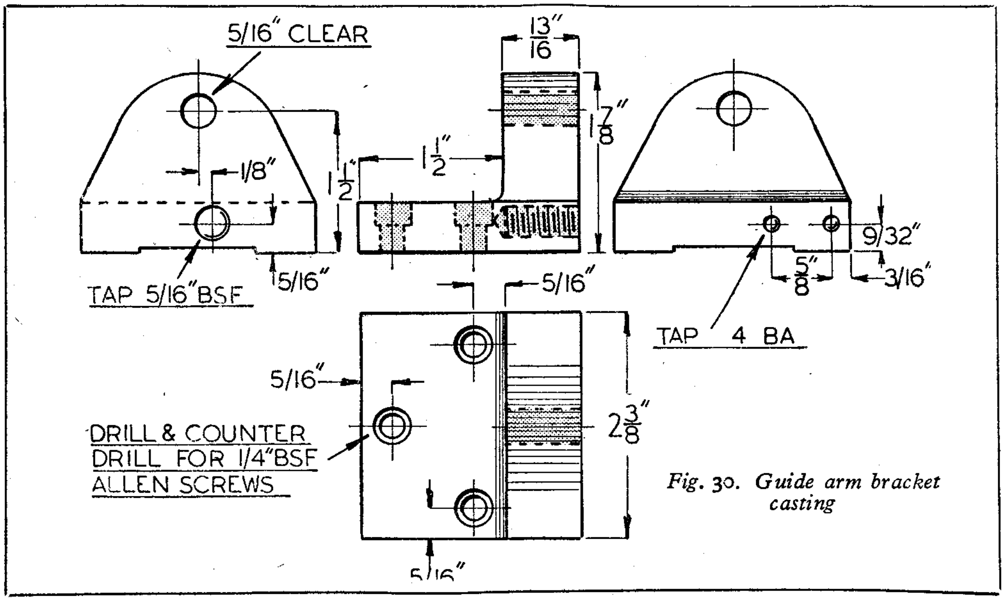


Fig. 30. Guide arm bracket casting

with the setting of the beam pivot arm as already explained.

The Guide Shaft

This part, again, can be clearly seen in Figs. 2 and 29. The shaft is securely bolted to the beam and is provided with two flats to prevent contact with the sides of the slot in the guide arm in which it moves. The further end of the shaft is machined to carry a short arm, Fig. 29, for actuating the automatic switch, but this mechanism will be described at a later stage when the electrical control gear is dealt with.

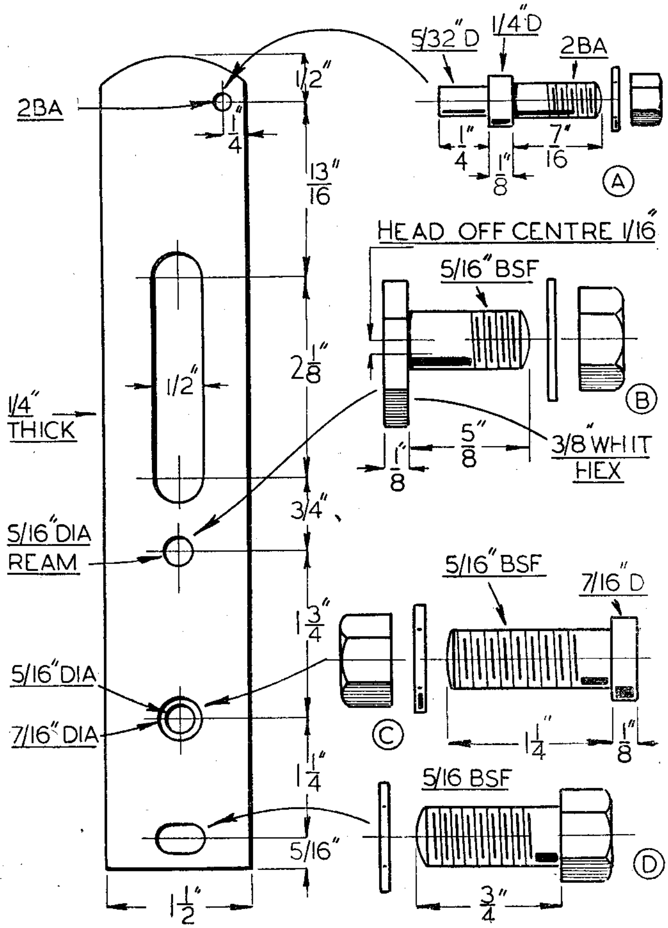


Fig. 31. The beam guide arm, latch pin and stop-bolt

Two guide collars are also mounted on the shaft; these are adjusted to make contact with either face of the guide arm so that they support the beam laterally. The dimensions of these split collars are given in Fig. 32, and they should be made a close fit on the shaft to enable them to be securely clamped in position after adjustment.

The Stop

To limit the downward movement of the beam when the saw breaks through the work, the guide collar next to the beam comes into contact with a stop-bolt fitted to the guide arm.

As the beam at the end of its travel may strike the stop with some force, the stop itself must be positively located and not made to slide for the purpose of adjustment. Accordingly, a stop-bolt of the form shown in Fig. 31 was fitted to the guide arm.

In order to provide a sufficient range of adjustment, the part is made from hexagon material, and the shank is machined $\frac{1}{16}$ in. eccentric to the head. As the stop is rotated, the flats on the head as they come into contact with the guide collar will, therefore, provide four different settings, each varying by 1/32 in. Moreover, as the point of contact is close to the beam, there will be but little tendency for the beam itself to tilt or twist when its downward movement is arrested in this manner.

The Beam Catch

The position of this part, with the beam lowered and also in the raised position, can be seen in the photographs, and its dimensions are given in the working drawings in Fig. 33.

Small parts such as this, which have a somewhat complicated relationship with other moving parts, usually require some hand fitting if they are to work satisfactorily; it is, advisable, therefore, to check the fit as the work proceeds in order to make allowance for any slight discrepancies in the machining of the parts. The catch itself, in the raised position of the beam, engages with the latch pin, Fig. 24, fitted to the upper end of the guide arm. In addition, as will be seen in Fig. 29, a pin, actuated by the control-rod, is fitted for the purpose of disengaging the catch when the control button is pressed.

The Weight Shaft and Catch Control-Rod

As will be seen in the photographs, this shaft is supported in two brackets attached to the beam, and its purpose is to carry the sliding weight which serves to load the saw blade. One end of the shaft is screwed into the left-hand bracket, but the other is made free to slide in order to facilitate the assembly of the parts. These brackets are, however, also utilised to form bearings for the control rod that operates the beam catch. The general arrangement of these

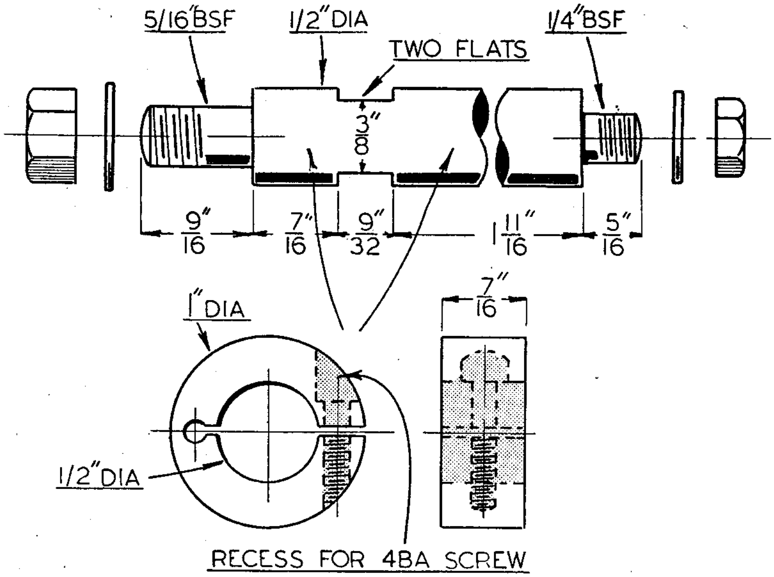


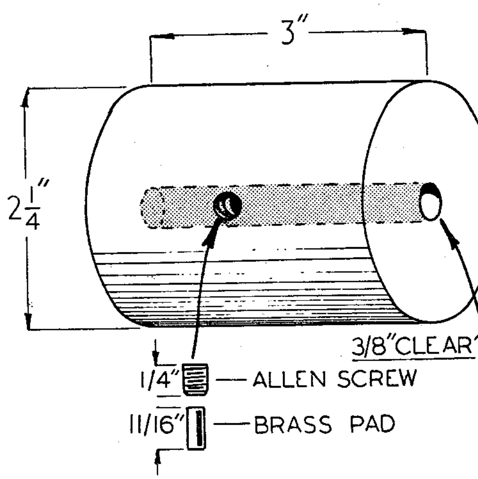
Fig. 32. Guide arm shaft and collars

parts can be seen in the photographs, whilst the drawings indicate the method of fitting the return spring to the catch control rod.

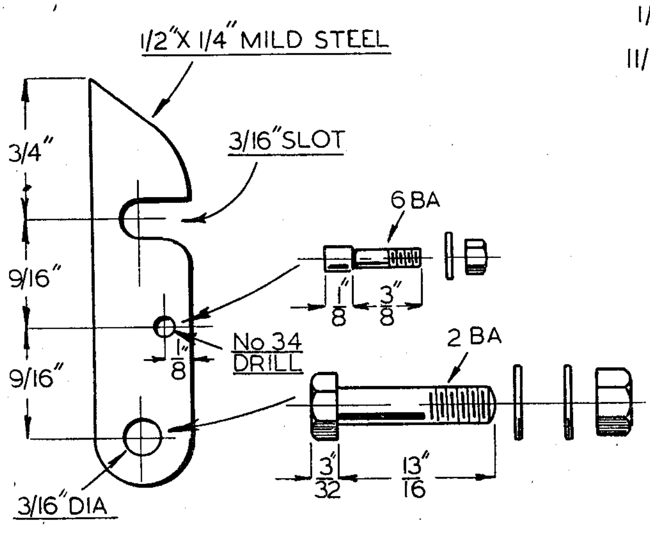
It will be seen, too, that a groove is turned in the control rod to accommodate the actuating pin fitted to the beam catch.

It may be found advisable to delay turning this groove until the exact position of the other parts of the catch mechanism has been checked and any small errors of fitting corrected.

A stop collar is shown fitted in contact with the right-hand weight-shaft bracket; this is set to limit the forward movement of the catch and so enable it to engage with the latch pin when the beam is raised. The weight-shaft bracket at the free end of the beam is attached by means of the shaft bolt shown in Fig. 34; this bolt is furnished with an ebonite knob for the purpose of raising and lowering the beam. As will be seen in the photographs, a small ebonite push button is fitted to the end of the catch control-rod. This arrangement allows the saw to be raised or lowered with the fingers of one hand acting at the extreme end of the beam and well away from the moving parts of the machine; as will be seen later, the electrical control gear is also fitted in this position.



Above—Fig. 35. The weight



Left—Fig. 33. The beam catch

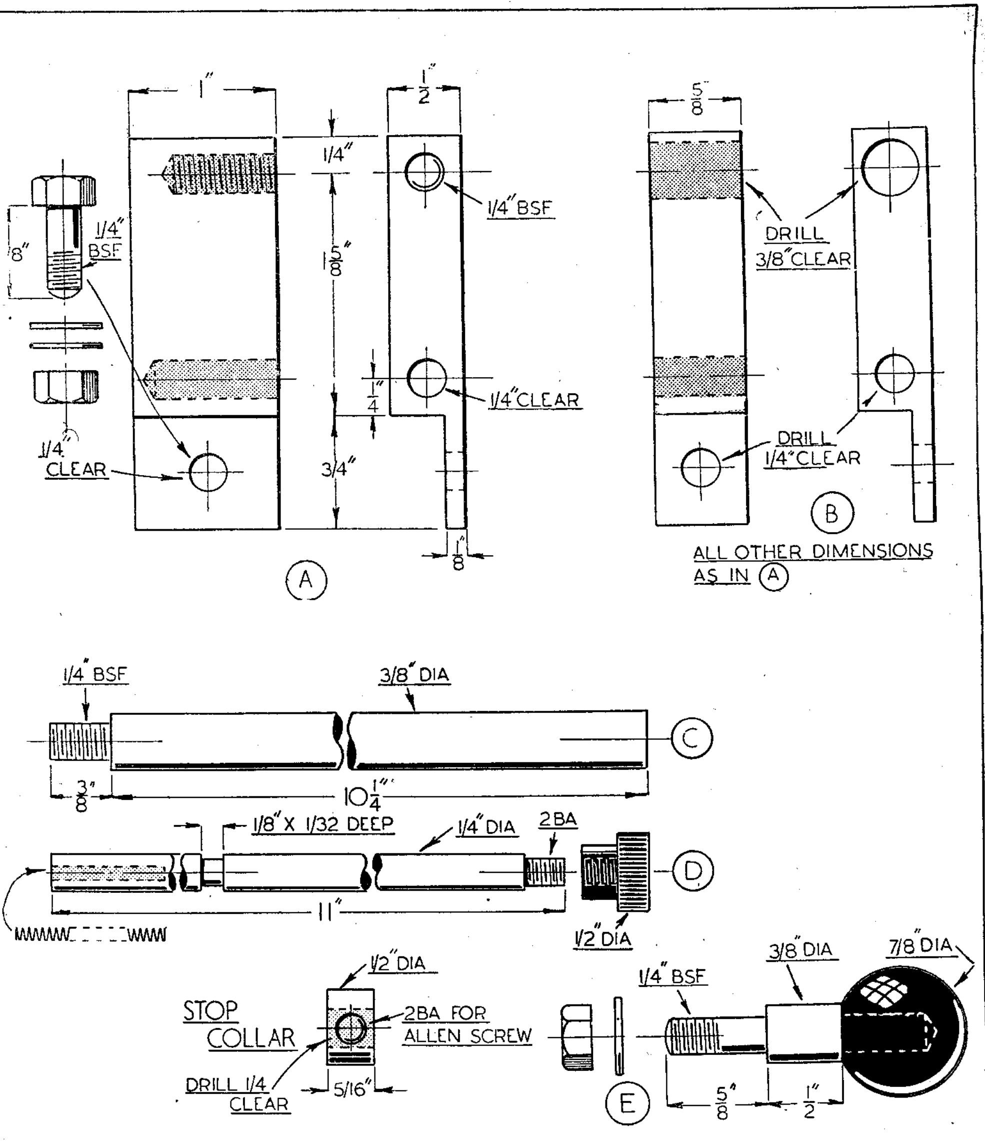


Fig. 34. *A—Left-hand weight shaft bracket ; B—Right-hand bracket ; C—The weight shaft ; D—Control-rod and stop-collar ; E—Beam-raising bolt and knob*

The Weight

The weight is made from a short length of mild-steel, turned all over and bored with a D-bit to slide freely on the ⅜-in. diameter weight-shaft. To retain the weight in position after adjustment, an Allen set screw is fitted to bear on a brass pressure pad. The finished weight, as shown in the drawing, Fig. 35, weighs approximately 3 lb., and this has been found by experiment to load the high-speed steel saw blade sufficiently to give satisfactory cutting without damaging the saw teeth. When an Eclipse Junior blade is fitted to the machine, the loading should be reduced by sliding the weight towards the beam pivot, for the full weight may cause the rather slender blade to bow, and the saw frame will not then travel on an even path.

(To be continued)

An Adjustable Vee-Block

of an Unusual Type

by W. M. Halliday

DURING die and tool manufacture, the die engineer will often find it necessary, convenient and useful to be able to mount a shaft or rod, formed with several different diametered portions, in a perfectly horizontal position within a pair of vee-blocks. Such requirements will arise, of course, when a shaft of this shape has to be marked off for the position of long keyways, holes, or for the fixing of components thereon, prior to machining.

Very often, too, the machinist will find it helpful to be able to set up a shaft of this kind exactly level within vee-blocks mounted upon the machine table, preparatory to milling slots, flats or keyways, etc.

The usual toolmaking practices for meeting requirements of this character are as follows :—A pair of identical 90 deg. vee-blocks are taken and the shaft positioned therein on the most suitable portions. The respective heights at each end of the shaft or immediately over the vee-blocks will then be checked by means of the vernier height gauge, in order to compute the thickness of packing required for insertion under the vee-block situated at the lowest end of the shaft. If very close accuracy of setting is desired, determination of the amount of packing required may, by this method, entail considerable time, because packings of an exact amount may well have to be built up from shims, or otherwise accurately machined or constructed.

Another method very often followed consists of first placing the shouldered shaft in the vee-blocks, then placing a dial indicator over each end again to determine the difference in heights of the two ends. This information affords only a rough idea of the amount of packing needed however, and thin shim-stock, strips or layers of paper may have to be applied several times to the vee-block before the shaft is finally set with its longitudinal axis exactly parallel with the surface plate or machine table.

A Useful Rule for Finding Packing Thickness

It is not widely known amongst toolmakers and machinists that the thickness of packing required for such a purpose can be very readily and quickly computed without recourse to involved trigonometrical calculations, or other mathematical complications so abhorred by the average shopmen. Moreover, the thickness of such packing can be ascertained with very close precision. If the customary 90-deg. vee-blocks are employed for this purpose, as usually is the case, the rule for determining packing thickness for any shaft, regardless of the difference in diameter of its shoulders resting on each block, is as follows :—

The thickness of the packing-piece will always be equal to the *difference* between the *two diameters* of the shaft *multiplied by* 0.7071.

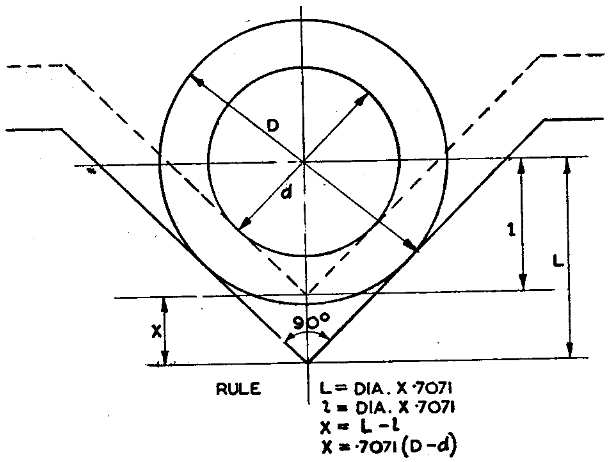


Fig. 1

This is clearly illustrated in the diagram, Fig. 1. This depicts an ordinary 90-deg. vee in which a shaft of D diameter has to be rested. The heavy broken lines indicate the position of the vee-block to suit a small shaft of d diameter. The packing required to bring both shafts on the same horizontal centre line in this block is denoted by the symbol X. This value, of course, is the difference between distances L and l respectively.

For any 90-deg. vee L equals $D \times 0.7071$. Therefore X equals $D \times 0.7071$ minus $d \times 0.7071$ which gives the rule X equals $0.7071 (D - d)$. This is an exceedingly useful and simple rule to remember, and it can be employed not only for determining the amount of packing for insertion underneath one vee-block, but also for checking the concentricity of the different diameters on a shaft, as is so often required in toolmaking activities.

An Adapted Form of Vee-block Adjustable for Height Settings

Based upon the above-mentioned simple rule, the author was able to design a very effective type

of adjustable vee-block, the use of which greatly simplified and facilitated shaft setting-up operations of the kind described at the outset of this article.

Referring to the various diagrams shown in Fig. 2, giving front, plan and side views of the block, its chief design and constructional features will be clearly understood, as well as the method of using the tool. It will at once be observed that the essential feature is the incorporation of a movable packing member positioned within the block itself. This movable piece is arranged for setting at any given amount of extension relative to the vee opening of the main block, and simple adjusting and locking provisions for retaining this sliding member securely in place are also included in the construction.

With this modified kind of vee-block, the need to employ loose packing blocks, slip gauges, or shim stock, etc., to raise the block to the required height, is entirely obviated. In conjunction with the simple height determining rule given above, the block may be very quickly and accurately adjusted and set to suit any differences in diameter on the shaft component being mounted.

In the diagrams at Fig. 2, *A* is the main vee-block, provided with the customary 90-deg. vee opening at one side. Each vertical endface and the horizontal base portion is machined for a certain depth and width to form the parallel sided guide slot *B*. The slot at each side is not carried right out to the top side of the vee-block *A*. Instead, a narrow wall piece is left about $\frac{1}{8}$ in. from the top as shown to leave a solid wall which is required for another purpose to be explained shortly. This slot *B* is made the same width and depth on each vertical side, each portion being in exactly the same plane. On the base of block *A* this slot is made the same width as the portions situated in the vertical sides, but the depth is slightly shallower as shown. The total width of this slot extending over the three sides of the block should be made about $\frac{1}{2}$ in. less than the overall width of the member *A*.

This guide slot must be accurately positioned and machined so that all portions are in line, and the two vertical sides lie perfectly parallel with each other and coincident with the vertical centre line of the main block *A*. The base of the slot along the bottom edge of *A* should also be parallel with the latter surface, and, of course, perfectly square with each vertical portion.

Fitted to slide smartly within this guide slot *B* is the steel slider block *C*, of U-shape. This element should preferably be made of tool-steel or mild-steel case-hardened and ground prior to assembly. In fitting this member a minimum of side-play should be allowed beyond that required for normal working clearance. The upper front view, Fig. 2, shows the slider block *C* assembled in position, denoted by heavy full lines, from which it should be specially noted that when this piece is in the closed position relative to the block *A*, its bottom surface should lie exactly level with the base of the main block shown. To ensure close precision in this respect it will be preferable to machine the slider block *C* closely to size, then to fit it into the main block, setting the piece down against the base of slot *B* in which position it should be clamped to the block *A*. By reversing the whole assembly and taking a light grinding skim off the bottom face of both members this will ensure they are finished off perfectly level.

An elongated slot *D* is provided in each of the vertical legs of the slider block *C*, the dimensions and locations of each slot being identical. The base of the slot *B* in the vertical portions of the main vee member is drilled and tapped in each case to receive the knurled headed locking screws *E*. By means of these two members the slider block may be clamped to the block *A* in any desired position within the capacity of the elongated slots.

In the case of a vee-block to be required for holding shafts, etc., whilst being machined, or having to deal with heavy components, the locking pressure obtained by screws *E* would prove insufficient to retain the slider block *C* in the correct position. To obviate all risks of this member being forced backwards into the slot *B* a pair of specially-shaped adjusting screws at *F* are employed. These items have an enlarged knurled head for finger gripping. Immediately underneath this head portion a concentric annular groove is machined around the screw, so as to form the integral collar portion shown at *G*. The width of this groove should be made plus 0.003 in. on the thickness of the wall portion remaining at the top of the slot *B* in the main block.

The grooved part of the screw is then fitted into the open-sided slot *H* cut into the wall of the main block in the fashion indicated, see right-hand end view. The threaded shank of each screw is passed into a tapped hole drilled vertically in the side leg of the slider block *C*, which hole in each case must be positioned directly in line with the slot *H*, so that the screw *F* may be readily rotated.

From this description it will be appreciated that if the two screws *F* are revolved simultaneously in the appropriate direction the slider block *C* will be pressed out of the slot *B* in the main block in a uniform manner. The threads on screws *F* should preferably be made a fairly fine pitch to enable slight adjustments to be effected to the amount of extension of the slider block *C*. From the side view it will also be noticed that the elongated slots *D* are situated off the vertical centre line in order to clear the tapped holes for screws *F* passing down the centre.

Another important function fulfilled by the two screws *F* is to afford positive retention of the slider block regardless of the clamping pressure obtained by the side lock screws *E*. The full weight of the shaft being held, or any cutting pressure exerted thereon during machining will be taken by the screws *F*, and particularly by the integral collar portion at *G*, which will restrain the slider block from moving backwards within slot *B*.

The heavy broken lines in the front elevation sketch Fig. 2, indicate the slider block *C* in a retracted position, when set to the overall dimension *X*, a distance which would first be ascertained by the application of the rule explained earlier. This calculated dimension would then be transferred direct to the vee-block by means of a vernier or micrometer caliper reading.

Method of Using the Modified Vee-block

Having first determined the difference in shaft diameters on the part to be mounted in the vee-block, this will be multiplied by 0.7071 thus giving the exact amount the slider block *C* must be extended from the main block. If the distance from the top of the vee-block to the base is first measured, distance *X* can be immediately obtained.

ner. Chief amongst them are the following which doubtless will prove of especial interest to toolmakers and machinists.

(1) No loose packing strips, etc., of any kind will be required, thus reducing greatly the delays and the amount of time usually occupied in setting up shafts of different diameters.

(2) Very close precision in height settings can be obtained because exact setting distances and

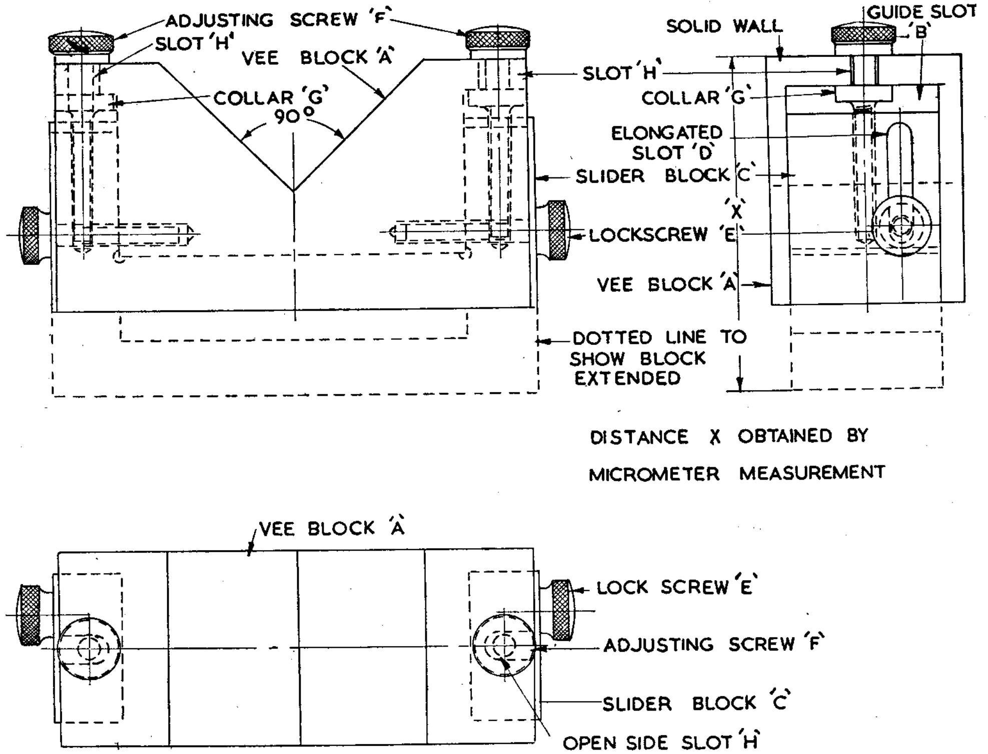


Fig. 2

When setting for this dimension the side lock screws *E* would be released and all adjustment made by means of screws *F* until the correct distance *X* is secured. The two screws *E* would then be locked in place and the screws *F* gradually turned in a reverse direction to bring the collar portion *G* in tight contact with the wall of the main block, to eliminate all slackness due to working clearance. Thus set the slider block *C* will be extended at the proper distance and positively retained in place, and thereafter the whole unit may be employed exactly in the same manner as with an ordinary solid vee-block.

If the bottom surface of the slider block is machined perfectly flat the whole assembled unit will then stand down squarely upon the surface plate or machine table, with an absence of " rockiness."

Advantages

Several very useful practical advantages are possessed by a block modified in the above manner.

measuring surfaces are provided on the block.

(3) When the respective members are set and locked together the height adjusting slider block is powerfully and positively retained in position, thus rendering the device suitable for machining as well as marking-out operations.

(4) In the case of settings which have to be duplicated over and over again, these may easily and accurately be determined. When loose packings and shims have to be employed, as with ordinary solid vee-blocks, the user may find these have been mislaid, or used for other purposes after a period of time.

(5) When a particular height setting has to be repeatedly duplicated the setting of the adjustable vee-block may be still further facilitated merely by providing a special detachable stop pin whereby the slider block may be located instantly relative to the main block. To accomplish this all that is needed is to drill a small hole crosswise through the side of the main block and so located to pass into the side of the U-shaped

(*Continued on page* 535)

ROLLER - BEARINGS

Some Difficulties Encountered in Construction and How They Were Overcome

by " Battiwallah "

THE experiences and operations set forth in this dissertation relate to efforts to make a big-end roller-bearing for a 40 c.c. petrol engine intended for motorising a push-bike. Let it be said at the outset that the culmination of those efforts was success and a feeling of satisfaction.

The principles involved and the recommendations made will, however, apply to bearings intended for other purposes, that is, so far as concerns the amateur constructor. The point which stands out is that it is possible, with the means ordinarily at the disposal of the amateur in his home workshop, to work to limits which warrant the determination of diameter by rigorous methods, for approximations can be misleading, as will be explained.

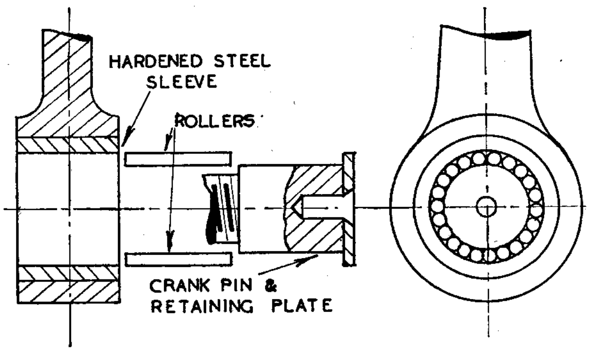


Fig. 1

The details of the actual bearing are shown in Fig. 1. Having decided suitable dimensions for the crankpin and rollers, it seemed so simple to say that the number of rollers was the pitch circumference divided by the diameter of the rollers. Any fractional remainder, provided it was small, would afford the required clearances between the rollers. A large total clearance would not do because the rollers could assume positions askew of the crankpin axis and so be subject to severe bending stresses. This method of settling the number of rollers means a certain amount of trial and error in the first estimate.

In the case in question, the crankpin diameter selected was $\frac{7}{16}$ in. which, for $\frac{1}{16}$ in. diameter rollers, gave a pitch circle of $\frac{1}{2} \times 3.14 = 1.57$ in. Multiplying this by 16 gave the number of rollers as 25.12. That meant, supposedly, 25, allowing 0.12 of $\frac{1}{16}$ in. = 0.0075 in. for clearances which appeared to be quite reasonable and the parts were made accordingly. Silver-steel rod, carefully " miked " to check that it was as near as could be to 0.0625 in. diameter, was used for the rollers and the outer bush was lapped to $\frac{9}{16}$ in. (0.5625 in.) diameter. The result was disappointing. Twenty-five rollers could not be fitted between the pin and the sleeves ; the last one was just that little bit too much ! All diameters were carefully checked again, and although the rollers may have been the merest discernible amount full, so far as could be gauged on an ordinary micrometer, that fullness seemed hardly sufficient to account for the last roller not fitting.

It was then realised that the method of computing the number of rollers was not correct. Although good enough as an approximation, my experience seemed to show that it was not sufficiently accurate to work to.

It can be seen at Fig. 2 that the angle subtended by one roller at the centre of the crankpin O, is $2A$ which is twice the angle whose sine is r/R, where r is the radius of the roller and R that of the pitch circle. In this case, $r/R = 1/32 \div \frac{1}{4} = \frac{1}{8} = 0.125$. This is the sine of 7 deg. 11 min. so that one roller subtends 24 deg. 22 min. at O. Now 360 deg. divided by this angle gives 25.05 and the odd 0.05 of the roller diameter —0.003 in.—is certainly cutting things rather fine. Here then was the fault, for the fullness of the rollers could easily have accounted for this small amount. To have reduced the number of rollers by one would have left too much clearance between them. Fortunately the crankshaft was a built-up one and the crankpin easily replaceable. A new one suitable for 24 rollers was decided upon, and here is how its diameter was worked out.

Each roller would subtend an angle of 360 deg./24 at the crank-pin centre in Fig. 3 in which A is half of this—$7\frac{1}{2}$ deg. Now the sine of $7\frac{1}{2}$ deg. is $r/(r + x)$ where x is the radius of the crankpin. Hence $0.1305 = 0.03125/(0.03125 + x)$ that is $x = 0.03125/0.1305 - 0.03125$ giving $x = 0.207$ in. The required diameter is therefore 0.414 in. An allowance must be made for clearances and $1\frac{1}{2}$ per cent. was deemed to be a reasonable amount, so the new crankpin was made 0.42 in. diameter. Of course, a new outer sleeve had also to be made, this having an internal diameter of $0.42 + 0.125 = 0.545$ in.

The method of arriving at the crankpin diameter has been given in full, as it demonstrates

the principle which can be applied for any other sizes. The pitch circle method is useful as a first approximation for deciding the number of rollers.

A few notes concerning methods adopted for producing the parts may be of interest.

facing to length on the emery wheel. The solder was cleaned off, the rollers replaced into the tube, and the whole brought to a dull red heat and quenched in oil. No discernible distortion occurred in any of the rollers. They were polished by rolling a few at a time between

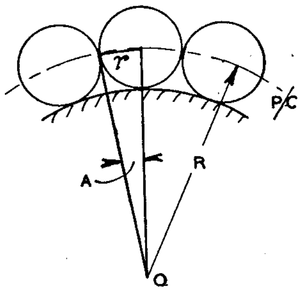


Fig. 2

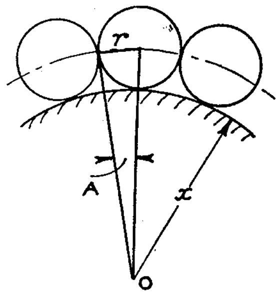


Fig. 3

two pieces of flat brass sheet smeared with a touch of fine lapping paste.

Crankpin

Made from silver-steel, this was screwed into the web with a fine thread. Before finally pegging into position it was hardened and tempered to a deep straw colour and lapped to size. Two thous. were allowed for this operation and no appreciable distortion occurred through the hardening process.

Rollers

A few preliminary trials showed that unless the rollers were constrained, serious distortion would occur through hardening. Thirty-seven $\frac{1}{2}$ in.-full lengths of $\frac{1}{16}$ in. diameter silver-steel were cut off and pressed into a mild-steel tube of the same length and lapped in the bore to a diameter of $\frac{7}{16}$ in., or more exactly, 0.4375 in. This number was selected because it is the nearest number of $\frac{1}{16}$ in. diameter circles to the required number which lie geometrically in contact. (It provided a goodly number of spares.) With one at the centre, successive layers were 6, 12, and 18. They were secured against movement by a spot of soft solder for

Outer Sleeve

Cast steel was used for this and the inside and outside diameters were machined with 0.002 in. allowance on each for final lapping. A mild-steel plug having a nice push fit was inserted in the bore as a safeguard against distortion during hardening. The heat treatment consisted of quenching in oil from a cherry-red heat and tempering to a dark straw, evenly heating in hot sand. The sleeve was then lapped to size, internally and externally, the first dimension being checked by a plug gauge lapped to size also (0.545 in. diameter)

Conclusion

On assembling the parts, the results were extremely gratifying. The 24 rollers fitted around the crankpin to a nicety; there was no lateral shake in the assembled bearing and it worked with a pleasing ease and smoothness, each roller turning evenly.

An Adjustable Vee-Block

(*Continued from page* 533)

slider block. This hole may be reamed out and a small removable dowel inserted to align both members in that setting. When the required setting again arises all that will be required will be to adjust the slider piece until the cross pin can be engaged.

(6) If the vee-block and extension slider-piece are made of tool-steel, or mild-steel suitably hardened and precision ground all over, a very accurate and durable construction will be attained.

The author has found this type of vee-block one of the most useful and time-saving tools at the disposal of the toolmaker, for simplifying shaft mounting and machining operations.

Novices' Corner

Sawing in the Lathe

SMALL circular saws, when driven from the lathe mandrel, can be used for cutting wood, plastics, and metal. When the work is fed to the saw by hand, a rectangular sawing table, such as that supplied by Messrs. Myford for their ML7 lathe, is attached to the lathe saddle and the work is then guided by a fence.

Light work, such as sawing strip metal, can be carried out quite well in this way, but for taking heavier cuts it will usually be found

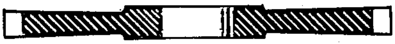


Fig. 1. A circular slitting saw shown in section

advisable to feed the work to the saw by means of a slide actuated by a feedscrew; otherwise, any crowding of the work on to the saw by too rapid or irregular feeding may cause damage to the saw teeth. Should a single tooth be broken off, a gap is thus formed in the saw and the following tooth may then strike the work with sufficient force to cause further breakage.

Using a circular saw, in conjunction with a sawing table, for cutting up heavy metal material may, therefore, prove uneconomical when the price of such saws is taken into consideration and compared with the cost of hacksaw blades.

In the small workshop, the circular saw is more commonly used for the accurate slitting of small parts, where the slightly irregular cut made by a hand hacksaw would appear unsightly; again, the heads of screws can be slotted in this way so that the slots are cut exactly central and to a uniform depth, but considerable practice is usually required before this work can be accurately carried out by hand sawing.

As shown in Fig. 1, these slitting saws are ground so that they become progressively thinner towards the centre; that is to say, they are hollow-ground, to give clearance behind the teeth, and so prevents the saw's jamming as it is fed into the work.

If a saw is examined, it will be seen that the hollow grinding does not extend right across the face, but a flat, central area is left to form a clamping surface for driving the saw.

These saws are made in various diameters and in several thicknesses. When choosing a saw, make sure that it is of sufficiently large diameter to cut to the full depth required. Very thin saws need careful using to avoid breaking the teeth and, moreover, a very flexible saw is apt to wander from the intended path in the work, particularly where the rate of feed is excessive.

A saw of $2\frac{1}{2}$ in. to 3 in. diameter will be found large enough for most slotting operations and, if it is to be used primarily for slotting screw heads, the thickness will depend on the size of the corresponding screwdriver blade.

Mounting the Saw

The saw must be secured to an arbor which is usually mounted between the lathe centres and driven by means of a carrier from the lathe catch plate. As shown in Fig. 2, this arbor has a register portion which serves to centre the saw accurately, for, if the saw does not run truly, some of the teeth only will do the cutting. The shoulder against which the saw is clamped should preferably extend to the full diameter of the flat clamping face formed on the saw. Large saws are usually provided with a keyway to engage a key fitted to the arbor, but small saws used for light work can be driven by the frictional contact established when the clamp nut of the arbor is firmly tightened.

It will be seen in the drawing that the register portion of the arbor is made longer than the thickness of the saw itself; this is done to avoid machining difficulties, and the nut is then correspondingly recessed to allow it to close on the saw.

As shown in the lower inset drawings, spanner flats are filed on the circular nut, and the tail end of the arbor is also provided with a flat, both to enable the arbor to be held securely in the vice when tightening the clamp nut and to form a seating for the lathe carrier. The arbor should

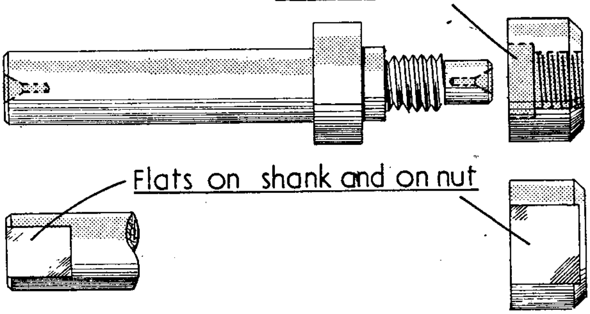


Fig 2. Saw arbor for mounting between the lathe centres

be turned from the solid bar, and a final finishing cut is taken to form the register to size, and also to machine the abutment face of the shoulder truly.

An alternative form of arbor is illustrated in Fig. 3; this arbor is intended to be gripped in the four-jaw chuck, and the saw teeth are then set to run truly with the aid of the test indicator.

Although setting up the saw in this way takes longer, it has the advantage that any slight out-of-centre error in the bore of the saw can readily be corrected. The arbor is shown fitted with a

driving peg; this peg by coming into contact with one of the chuck jaws will check any tendency for the arbor to slip in the chuck and, at the same time, will save having to tighten the chuck jaws unduly to afford a secure drive. It is advisable to make the peg of silver steel so that it will resist the shearing action of the chuck jaw, and, as indicated in the drawing, the hole for the peg should be drilled right through the

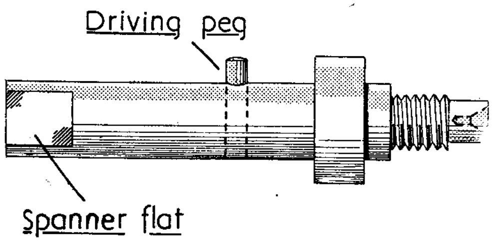


Fig. 3. Saw arbor for mounting in the four-jaw chuck

arbor so that, if damaged, the peg can easily be replaced.

As before, a flat is formed on the arbor to afford a secure grip for the vice when tightening the clamp nut.

Using the Saw

In the first place, the saw must be driven at a suitable speed so that it cuts to the best advantage, without unduly prolonging the sawing operation or causing damage to the teeth by driving too fast. A carbon steel saw, when cutting mild steel, may be run at a speed of 50 ft. per minute, measured at the periphery; so that a 3-in. diameter saw, having a circumference of approximately $\frac{3}{4}$ ft., can be driven at $\frac{50 \times 4}{3}$ r.p.m., which equals 66 r.p.m. This means that in most small lathes, the Myford ML7, for example, the middle speed of the back gear should be employed. When cutting brass or aluminium, however, the driving speed can safely be doubled without danger of damaging the saw teeth; moreover, if a high-speed steel saw is used, the driving speed may be increased to twice that suitable for a carbon steel saw.

Small work can usually be clamped in the lathe toolpost, and is then set at right-angles to the lathe axis by bringing the projecting end of the material into contact with the face of the chuck, or by taking measurements with a rule from this face.

The centre line of the slit should be marked-out on the work, and it will assist in aligning the saw if, as shown in Fig. 4, two guide lines are scribed corresponding to the width of the saw. At the same time, the saw will cut evenly on both the upper and lower surfaces of the work if the centre line of the work is set at lathe centre height. After the lathe has been started, the work is fed against the saw so as to keep the teeth cutting evenly; that is to say, the saw must not be allowed merely to rub without cutting, nor must the work be crowded on to the saw. During the cutting operation on steel parts, a brush dipped in cutting oil should be held against the teeth both to assist lubrication and to help to clear the teeth of swarf.

When, as illustrated in Fig. 5, the slitting operation involves cutting into or across a drilled hole, great care must be taken in feeding to avoid the saw teeth grabbing and being broken off when meeting the inclined edge of the hole; this is particularly noticeable when the hole is drilled vertically in the work, for then the saw teeth will meet with but little resistance once one side of the hole has been cut through. To prevent this, it is advisable to tighten the cross-slide locking screws slightly so that the feedscrew is made rather stiff to operate; at the same time, any excessive backlash in the feed mechanism should be taken up.

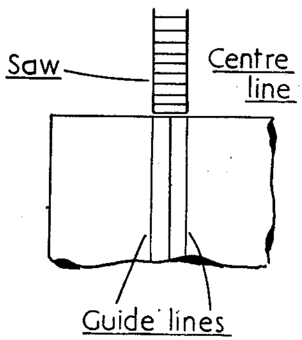


Fig. 4. Method of aligning the work with the saw

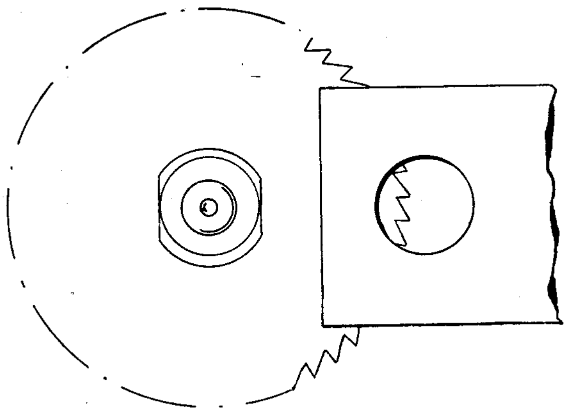


Fig. 5. The saw may grab when cutting into a drill hole

As already mentioned, the circular slitting saw is most useful for slotting the heads of a batch of screws. For this purpose, a carrier to hold the screws is made from a length of square brass or steel rod as illustrated in Fig. 6A. To save space in reproduction, the end portion only of the carrier is shown in the illustrations, but in practice the carrier should be made some

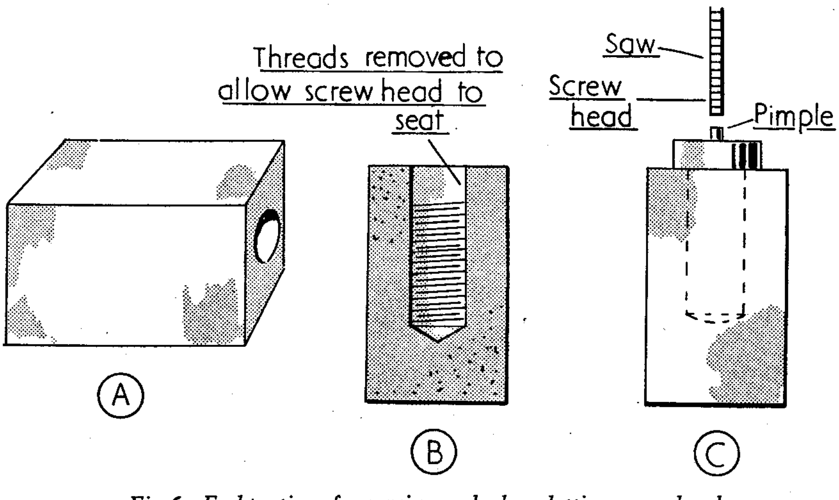


Fig. 6. *End portion of a carrier used when slotting screw-heads*

three or more inches in length so that it can be firmly gripped. This carrier is secured in the lathe tool-post at right angles to the lathe axis and so that its centre line is at lathe centre height.

To enable the screw heads to bed against the end of the carrier and thus ensure that the slots are cut to uniform depth, the outer portion of the threaded hole is enlarged to the clearing size of the screws, as shown in Fig. 6B. The work of centring the screw head in relation to the saw will be facilitated if one screw is parted off so that a small spigot remains, roughly equal to the width of the saw teeth.

As represented in Fig. 6C, this spigot is then used as a setting guide for aligning the work with the saw. Once the carrier has been set in this way, the saddle is locked and the adjustment holds good for the remainder of the screws. When the correct depth of the slot has been determined, the reading of the cross slide index is noted so that the rest of the batch of screws can be slotted to a uniform depth.

"The Lathe That Won't Turn True!"

AMONG the many readers who write to us for advice on their workshop problems and troubles, there are always a few who are very disconcerted and bewildered at their inability to obtain good results with normal model engineering equipment. Some of these readers have had a certain amount of experience with factory machine-shop practice, but in applying similar methods in the home workshop, they find it does not work out properly, and are inclined to jump to the conclusion that the equipment is at fault. The fact is, however, that most successful model work is carried out with equipment which the professional mechanic would find hopelessly inadequate. This is not a disparagement of the latter's ability, as industrial work introduces elements of economics which are not considered by the amateur worker. But most model engineers soon learn to realise that good work can be produced on the simplest, and indeed most primitive of lathes, given the necessary care, patience and resourcefulness. One of our readers has informed us that he has purchased two lathes, in succession, a $2\frac{1}{2}$-in. plain lathe and a $4\frac{1}{4}$-in. screwcutting lathe, and has failed to turn, drill or bore true in either of them. He does not state the make of the lathe in either case, but while it is true that there have been, and still are, lathes of very poor design and accuracy on the market, even these do not prevent model engineers producing good work when once their limitations are known and allowed for. One clue to our correspondent's approach to the problem lies in the fact that he has obtained a set of tipped (tungsten carbide ?) tools. While the advantages of such tools in production practice are beyond question, they are by no means essential to satisfactory or efficient work in the type of lathe he is using, and in many respects the worker who starts with a set of carbon tools is better off, because he soon learns their limitations by experience, and thereby grasps the first principles of cutting speeds, rake and clearance angles, and permissible rates of feed. If a lathe fails to turn or bore parallel, the reason lies in incorrect headstock adjustment or alignment of centres ; faults which, we may add, are by no means exclusive to light or cheap lathes. We are sympathetic to any of the difficulties brought to our notice by readers, and always willing to give them all the advice and assistance we can ; but here is an instance where, in the last resort, help can only come from within.

“Let’s Hold a Social!”

by G. G. Corder

THIS is the phrase which causes many a worthy secretary, otherwise the acme of efficiency, to blanch at a Committee meeting, when either to return hospitality received elsewhere, to fill an evening after an inter-club rally or to placate model-widows who are showing signs of revolt, a member tosses off the suggestion with all the carefree abandon of one who has not got to organise it.

Take heart, fellow secretaries! It is not as difficult as it looks, and your faithful scribe will now divulge the accumulated wisdom gained by running a number of such events.

It is assumed, for the purpose of this article, that the event is not in the nature of a “Big Do,” which can be met by a dinner, speeches and a dance to follow at the local hotel, and which does not require any specialised knowledge to organise. It is also assumed that your society membership contains a goodly proportion of adult types, to whom jive, bebop or any other forms of organised horseplay will not appeal and also (here we are pretty sure to be right)—you can obtain the use of a small hall for the evening, but otherwise It Must Not Cost Too Much. Right? Right!

As a preliminary observation, it is remarkable the heights of foolery which can be reached if the company is led up to it gradually. It is necessary, however, to break the ice as early as possible. The best possible method is to have a bar counter in the room, when tongues are loosened and the awkward first half hour, during which the late arrivals come, can be passed off without the organisation of any particular activity. This is not always possible, however, and the running of a “mix-’em-up” game is desirable. A number of such games can be purchased cheaply at stationers; the common factor in all the required type of games is a number of cards which can be placed round the hall. The guests are issued with a piece of white card (so much more convenient than a slip of paper) as they arrive, together with a pencil attached with a ribbon, and the game requires that they shall examine all the cards, which are usually numbered, and the first one to arrive at the answer applies to the organiser. One version of this game is the random splitting up of a connected story—usually humorous—into a number of phrases and distributed (out of numerical order) over the twenty-five or thirty cards round the hall. Competitors are required to bring to the organiser a list of the cards, arranged in the correct numerical order to tell the story in connected form.

By the time your guests have clustered round the various cards, breathed down each other’s necks, trodden on each other’s feet and cheated by telling each other their results, they will have lost some of their shyness and will be more receptive to Game No. 2.

Whilst No. 1 has been in progress another committee member will have erected two blackboards, both provided with chalk and a duster, a few yards apart. You will then form two teams, either by suggesting ladies *v.* gentlemen or by having two colleagues pick the teams. The procedure is then as follows: The first member of each team will come to you separately; you will whisper to them the name of an object which they are required to draw on the blackboard. They must continue to draw until a member of their team, all of whom watch his efforts, can name the object. No writing must be added to help in recognition. No 2 of the team can then come to you for another object, and so on, until all the members of a team have drawn the required objects and had them recognised. It must be made clear that the event is a race and that speed is essential. A carefully prepared list of objects is necessary if the utmost amusement is to be caused. They should be subjects which are known to all present, but can include some which verge on the abstract such as “a thunderstorm,” “a bad smell” as well as “a map of the county” or “your route here this evening” and other items which are current news. You should have sufficient on your list so that both teams have different subjects.

While the two teams are in existence, a sit down team game can be introduced as Game No. 3—a team general knowledge quiz. A question master and a scorer are required. Have sufficient questions ready to give each guest about ten questions. Care should be taken in the selection of questions, that they are pitched at a level which will not cause embarrassment because guests are unable to answer them; usually a scanning of the week’s newspapers will furnish ample material. Do not be afraid of making them too easy; people forget the simplest facts in a matter of hours. The system of running the event is as follows: Your questions are numbered and competitors are asked to choose their number; this prevents criticisms that you are picking out easy ones or difficult ones for individuals. The first question is put to the first member of Team A; if answered correctly, the team scores two points. If he is unable to answer, the question is thrown open to the whole team. If answered by one of its members, 1 point is scored for the team. If no one in Team A can answer, it is thrown open to Team B. If answered by them, 1 point is scored for Team B. The first member of Team B is then asked to choose a question, and questions are thereafter given alternately to the two teams. The team with the most points wins.

In my experience, allowing for a slow start and the chatter between events, the foregoing will use up about half the available time i.e. about an hour and a half. Now would be a suitable time for refreshments.

If the party is small e.g. 15-25, a short session of “Beetle” is amusing. This is a proprietary game which can be purchased cheaply and requires one dice for each two or three players. It consists of throwing dice and, according to

the score obtained, building up on the special card provided a sketch of a beetle. The various parts of the beetle—head, feelers, legs, etc. each carry a different value. The game is a race.

Another race game which can be prepared easily by members is "Greyhounds." Six greyhounds, cut out of plywood or sheet metal and suitably painted and numbered, are mounted on baseboards, 12 in. × 3 in., provided with wheels. A length of string is attached to each and is wound on a short length of dowelling. The dogs are lined up, the strings paid out and competitors are required to move the dogs by winding the string up on the dowelling.

Another version of this type of game is to provide a length of batten about 12 ft. long, lashed to chair legs 6 in. from the floor, with lengths of string attached at about 2 ft. centres.

On the strings are threaded rectangles of card or thin-gauge metal about 10 in. × 8 in. A ⅛ in. hole is punched centrally on each about 6 in. up on the 10 in. dimension. If the string is held stretched horizontally, lowering slightly will cause the card to fall backwards or forwards. Raising it slightly will cause the bottom of the card to swing backwards or forwards. By suitable manipulation, the card can be made to "walk" in either direction. Races can then be held to bring the card up to the competitor and get it back. Practise yourself beforehand so that you can demonstrate it.

The time is now probably ripe to introduce something a little more boisterous. Here is a team game played with balloons. Arrange two rows of chairs in tandem and seat the two teams. Give the first of each team a balloon. At a starting signal they are required to run round the chairs, return to their seat, blow up the balloon and burst it by sitting on it. You then hand a balloon to No. 2 who repeats the procedure and so on. The first team to finish wins. Note—Check that your balloons are not the tough variety which are almost impossible to inflate by mouth.

If gramophone music is available, here is another romp. Arrange the company in a circle. Hand each guest, except one, an old hat—the older the better. As the music plays, the guests are required to take the hats from their heads, put them on the heads of the players on their right and be crowned by the players on their left. When the music stops, the one without a hat retires. One hat is taken away and the music resumes. The two remaining at the end win. Note—Check tactfully that none of your guests wears a toupee!

By my reckoning they will by this time have had enough of it and the evening could be brought to a close. It is always best to stop with everyone wanting more than to continue overlong. The supply of some small prizes for some of the events need not cost more than a pound. A number of articles can be purchased for less than 1s. each; modellers can be given hacksaw blades, sheets of glass-paper, drills, etc., as well as lighter service repair kits, lighter flints and cigarettes. The ladies can be given small household or sewing requisites; little ornaments can also be obtained in this price range.

It is usually the simplest game with little or no equipment which gives the most pleasure and much depends on the thoroughness of preparation, and the personality of the M.C.; but adult people, old enough to "know better" will vote the evening a success if you induce them to enter into the various pieces of tomfoolery in the right spirit.

The writer will be willing to advise secretaries on alternative or special programmes if approached through the Editor.

An Appropriate Memorial

AT the recent exhibition in Worthing, the second organised by the Worthing and District Society of Model Engineers, we were particularly interested and gratified to find a stand devoted entirely to the work of the late A. W. Marchant. We sincerely hope that this "A. W. Marchant Memorial Stand" will be repeated at each future exhibition, if only to serve as an inspiration to those who are fortunate enough to be able to examine the examples of work on it; for Mr. Marchant was a natural craftsman without any but self-taught knowledge of mechanics, though with a tremendous enthusiasm and an unquenchable desire to achieve perfection in anything he attempted.

The success which he attained is best measured by the fact that the model which was, perhaps, his *magnum opus*, a single-cylinder diagonal surface-condensing paddle engine, won the Championship Cup at the "M.E." Exhibition in 1936 and now rests in the Science Museum, South Kensington, among some of the world's choicest examples of model engineering. Fourteen examples of his work were on view at Worthing; they covered a long period of his life; many were in an unfinished condition, but they were fully illustrative of his catholicity of taste, in spite of strong preference for the steam railway locomotive. But they all showed a perfection of detail and workmanship which is rare, indeed. Even a simple, "O"-gauge, spirit-fired steam locomotive, built for his grandson, was an exact replica of a Southern Railway 4-4-2 Tank engine of the "I1/X" class. We learned, with much satisfaction, that the beautiful ¾-in. scale G.W.R. "Hall" Class 4-6-0 locomotive, of which the tender is finished and the engine much more than half-finished, is to be completed by Mr. Marchant's son, than whom nobody is more familiar with his father's ideas and methods, or better qualified to undertake the task of completing such an outstanding piece of work.

This engine, begun in 1936, belongs to Marchant's later period; beside it rested an example of his early work, a small working model of a Merryweather steam fire-engine boiler and pump, built when he was 18 years old, but displaying that same facility for exact reproduction of detail and proportion that was characteristic of all his later work. It is more than desirable that the actual achievements of such a man should be kept constantly before us all.

PRACTICAL LETTERS

Stationary Steam Engines

DEAR SIR,—As the son of the inventor of the central valve engine, I naturally read Mr. Bell's letter with great interest.

I think that I have seen the engines he speaks of which are operating as back pressure engines, taking steam at boiler pressure and, after producing electricity, passing on steam at about 5 lb. per sq. in., for heating and cooking. If you must have steam for such purposes no super power station can produce electricity to compete with the method adopted.

Within easy walking distance of the "M.E." offices there is a private power station also running with Willans engines. The oldest engine, installed in 1887, still does its regular turn of duty.

However, these examples pale into modernity when compared with the two engines pumping on the Kennet & Avon Canal about 17 miles from my house. The older engine, built by Watt, was installed in 1805 and converted to run as a Cornish engine about 1840 when a genuine Cornish engine was installed in place of another Watt engine alongside it. Both engines run turn about for a fortnight or so at a time three to six days a week, and about ten hours a day.

Yours faithfully,

Devizes. KYRLE W. WILLANS.

Tiller Steering

DEAR SIR,—On the above subject, Mr. J. A. Smith takes me to task for saying that tiller steering on steam rollers was not usual—he says "This is not so and was adopted by other makers."

I am aware, of course, that tiller steering was adopted by other makers, but that does not make it a "usual" feature on steam rollers in general. In fact, I would wager that many "M.E." readers have never seen a tiller-steered steam roller, except in a photograph! And why? Because the vast majority of steam rollers had the *usual* (conventional) type of traction engine steering, by chains.

So, still unrepentant, I maintain again that tiller steering is *not* "usual" for steam rollers. One might just as well say that these vehicles are "usually" fitted with two high-pressure cylinders, like Mr. Smith's "Advance" roller!

Yours faithfully,

Sheffield. W. J. HUGHES.

Miniature Sparking Plugs

DEAR SIR,—I should like to strongly support Mr. J. Riding's letter recently on the above subject. It is more or less obvious that the only types of manufactured sparking plugs which will stand up to the high power output of model race car, aircraft and powerboat engines are of American origin, which are extremely difficult to obtain these days. There are many manufacturers of plugs in this country, quoting Lodge, K.L.G., etc., who, if they were sufficiently interested (or possibly approached), could produce a "hot" plug equal, I am sure, to any other. The reliability of ignition equipment on full-size aircraft, ships, automobiles, etc., during the recent war and today, proves this beyond any doubt. Could not some British plug manufacturer take this very interesting subject up, and produce a range of small sparking plugs? I am sure there would be the sales for them in all spheres of the model internal-combustion engine section. What are other readers opinions of this?

Yours faithfully,

Newcastle, Staffs. H. S. HOWLETT.

No Water from a Duck-pond

DEAR SIR,—When discussing the noble art of shovel and pump with an aged *ex*-traction engine driver recently, I was surprised and interested to learn from him that he would never draw water for his engine from a pond used by ducks, as he stated that it always caused considerable priming. I wonder if any of your readers can confirm other instances of this and give any reason for it?

Yours faithfully,

Brighton. S. R. BOSTEL.

Workshop Power Supplies

DEAR SIR,—As a practising electrician in the electrical contracting industry for the past 14 years I would like to offer a few suggestions regarding Mr. D. Blackhurst's article on this subject in THE MODEL ENGINEER of August 31st.

Why use 7/.029 in. cable for lighting when 3/.029 in. cable is the size invariably used in practice, and cheaper, too? (After all, we are not all millionaires yet!)

I agree with earthing; it is most important. 7/.036 in. cable is ample for the main supply in, as it is rated at 20 amperes, but why use lead-covered cable in conduit? Tough rubber sheathed (T.R.S. for short) is cheaper and, in damp situations, far better. If the whole installation is done in conduit, special vulcanised india rubber cable (V.I.R.), taped and braided, is used. Again money enters into it as it is far cheaper than L.C. or T.R.S. cable.

By the way, 30-s.w.g. tinned copper fuse wire fuses at 14 amperes approximately, not 20 amperes. 26-s.w.g. should be used for a 20-ampere fuse.

According to the rules and regulations of the Institution of Electrical Engineers for the Electrical Equipment of Buildings (12th edition), each 15-ampere socket outlet must be wired in 7/.029 in. cable run back to the fuseboard, with its own pair of fuses. Lighting should not be fused above 5 amperes, as Mr. Blackhurst says. I have raised my hands in horror at the things people stick in fuses (such as silver paper and, on one occasion, a hair pin (fusing at about 150 amperes)). A card of proper fuse wire can be obtained at any chain store for as low as 3d.

Readers should note if they buy an ammeter for use on a.c. that it is not a moving coil type as this only works on a.c. when used with a rectifier. Please be careful how you use govern-

ment surplus equipment on 230 volt supplies. Too many accidents are caused by electricity nowadays.

I hope this will be of some use, in conjunction with Mr. Blackhurst's article, to all readers of THE MODEL ENGINEER as "Electricity with Safety" is my pet subject.

Yours faithfully,

Melton Mowbray. J. N. LAXTON.

Modelling a "Double-ender"

DEAR SIR,—May I be allowed to draw attention to a slight error in Mr. Hughes' remarks on Mr. R. E. Tustin's model of the locomotive, *Merddin Emrys* on page 266 of the August 24th issue?

He states that she would make a fine passenger-hauler if built to 1-in. scale for $3\frac{1}{2}$-in. gauge. As the gauge of the prototype was only 1 ft. $11\frac{1}{2}$ in., the gauge for 1 in. scale would be barely 2 in., and, alternatively, the scale for $3\frac{1}{2}$ in. gauge would be $1\frac{3}{4}$ in. to the ft., as near as makes no matter.

I have often considered building a model in $3\frac{1}{2}$-in. gauge, which would make an astounding engine on that gauge, but the insurmountable difficulty so far has been driving it. The firebox would be in the middle, with the regulator and reverse lever, and the rear chimney directly under the nose of the driver. Not funny!

Perhaps your contributor or some other readers have some ideas as to how to overcome this snag.

Yours faithfully,

London, N.7. M. EDWIN MOON.

CLUB ANNOUNCEMENTS

West London Society of Model Engineers

The exceptionally well equipped club workshop at Middle Row L.C.C. School, Kensal Road, W.10, is now open each Monday and Thursday evening.

The club caters for all branches of model engineering, and there are still a few vacancies for new members. Enquiries are accordingly invited by the secretary, E. J. OAKERVEE, 92, Harvist Road, Kensal Rise, N.W.6.

Hayes and Harlington Model Engineers Society

The above have had a change of officers recently owing to the secretary retiring.

Our recent exhibition was a great success and over 100 different items were on show; it was the best we have put up so far.

Our winter programme is fully booked up and our October programme is as follows:—

October 7th. Track day.

October 8th. Club visit to Watford track at Chipperfield.

October 19th. Film show: "Romance of Carborundum" and L.M.S.R. films.

October 21st. Last track day.

The society are setting themselves the task of organising the club workshop and will soon be making a start on a club locomotive.

Meetings take place on the first and third Thursdays of each month. Full particulars from the hon. secretary, R. W. NASH, 26, Goshawk Gardens, Hayes, Middx.

International Radio Controlled Models Society

Details of forthcoming meetings of the above society are as ollows:—

Manchester Group. Saturday, October 21st, at 2.30 p.m., at the Milton Hall, Deansgate, Manchester. Mr. T. F. Sutton will demonstrate his cabin cruiser, fitted with three-channel reed control system.

Tyneside Group. The group has a stand at the Tyneside S.M.E.E.'s exhibition from October 16th to 28th, on which radio-controlled models and equipment will be demonstrated. Next meeting is Friday October 27th, at 7.30 p.m., at the Y.M.C.A., Newcastle.

Birmingham Group. Saturday, October 7th, at 2.30 p.m., in the History class room, University of Birmingham, Edmund Street, Birmingham.

London Group. Details from N. A. Ayres, Carlton Lodge, Princes Risborough, Bucks.

It has been decided to hold and international radio-controlled model aircraft competition next Easter.

Hon. Secretary: T. F. SUTTON, The Lodge, Manchester Grammar School, Manchester, 13.

Aldershot and District Society of Model Engineers

Our forthcoming exhibition of models will be held at the Presbyterian Hall, Aldershot, on Friday, October 20th, from 2 p.m. till 9 p.m. and Saturday, October 21st, from 10 a.m. till 9 p.m.

We shall be very pleased to meet members of other societies and model builders generally who care to pay us a visit on this occasion.

Hon. Secretary: J. T. HILL, 158, Marrowbrook Lane, Farnborough W., Hants.

Weybridge and District Model Railway Society

The above society has been formed in the Weybridge district.

Would anyone interested please communicate with the secretary, V. C. MCCARTY, 11, Ashley Park Crescent, Walton-on-Thames, Surrey?

The Marlow Society of Model and Experimental Engineers

The above society has been formed recently, and any interested reader in the district wishing to join should get in touch with the hon. secretary, JOHN HOBBS JNR., The Boathouse, Marlow-on-Thames, Bucks.

The Junior Institution of Engineers

Friday, October 6th, at 6.30 p.m., 39, Victoria Street, S.W.1. Film evening: (1) "The Manipulation of Corrosion and Heat-resisting Steels"; (2) "Some Applications of Firth Vickers Special Steels."

Friday, October 13th, at 6.30 p.m., 39, Victoria Street, S.W.1. Chairman's address, "Prestressed and Vibrated Concrete," by S. J. Crispin, L.R.I.B.A., M.I.Struct.E. (Member.)

Friday, October 20th, at 6.30 p.m., 39, Victoria Street, S.W.1. Informal meeting. Paper, "Fuel and Farm Mechanisation," by H. W. Arkell, M.Inst.F. (Member.)

Sheffield and District Section. Friday, October 20th, at 7.30 p.m., Grand Hotel, Sheffield. Annual general meeting and chairman's address by A. V. Jobling, B.Sc.(Lond.). (Member.)

Friday, October 27th, at 6.30 p.m., 39, Victoria Street, S.W.1. Informal meeting. Paper, "Considerations of Drawing Office Management and Practice," by J. M. Attwood (Member) and J. M. Tebby, A.M.I.Mech.E. (Member).

Friday, November 3rd, at 6.30 p.m., 39, Victoria Street, S.W.1. Film evening: (1) "Mitia"; (2) "Wimet Age," introduced by F. Bates.

Friday, November 10th, at 6.30 p.m., 39, Victoria Street, S.W.1. Ordinary meeting. Talk, "Abatement of Noise and Vibration in Industry," by J. Calderwood, M.Sc., A.F.R.Ae.S., M.I.Mar.E., M.I.N.A. (Member.)

Friday, November 17th, at 6.30 p.m., 39, Victoria Street, S.W.1. Informal meeting. Paper, "Rubber in Aircraft," by F. M. Panzetta, M.B.E., A.M.I.Mech.E., F.I.R.I. (Member.)

Sheffield and District Section. Friday, November 17th, at 7.30 p.m., Grand Hotel, Sheffield. Presidential address, "Some Notes on the Early Days of the Manufacture of Railway Tyres in Great Britain," by George Baker, O.B.E., M.I.Mech.E. (Member.)

Friday, November 24th, at 6.30 p.m., 39, Victoria Street, S.W.1. Annual general meeting and annual meeting of contributors to the benevolent fund.

Friday, December 1st, at 6.30 p.m., 39, Victoria Street, S.W.1. Film evening: (1) "Combustion and the Chain-grate Stoker"; (2) "Pulverised Fuel"; introduced by R. F. Archer.

Friday, December 8th, at 6.30 p.m., 39, Victoria Street, S.W.1. Ordinary meeting. Paper, "Choice of the Method of Hub Fixing," by J. M. Tebby, A.M.I.Mech.E. (Member.)